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Editorial correspondence including manuscripts and submissions:

Prof. dr. Manuela Tvaronavičienė

Tel.: +37068783944

E-mail: submissions@jssidoi.org or manuela.tvaronaviciene@jssidoi.org

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CONTENTS

1. Daiva Tamulevičienė, Armenia Androniceanu. SELECTION OF THE INDICATORS TO MEASURE AN ENTERPRISE'S VALUE AND ITS CHANGES IN THE CONTROLLING SYSTEM FOR MEDIUM-SIZED ENTERPRISES	1440
2. Dussadee Nakruang, Kwunkamol Donkwa, Adisak Suvittawat. THE CAUSAL FACTORS INFLUENCING CORPORATE SUSTAINABILITY PERFORMANCE: CASE OF COMMUNITY SMES IN THREE SOUTHERN BORDER PROVINCES, THAILAND	1459
3. Alfreda Šapkauskienė, Ingrida Višinskaitė. INITIAL COIN OFFERINGS (ICOs): BENEFITS, RISKS AND SUCCESS MEASURES	1472
4. G.T. Glembotskaya, S.Yu. Eremin, E.E. Chupandina. SCIENTIFIC PRIORITIES AND REAL PROSPECTS FOR COST OPTIMIZATION IN FORMULATION DEVELOPMENT	1484
5. Iman Harymawan, Mohammad Nasih, Atila Salsabilla, Fajar Kristanto Gautama Putra. EXTERNAL ASSURANCE ON SUSTAINABILITY REPORT DISCLOSURE AND FIRM VALUE: EVIDENCE FROM INDONESIA AND MALAYSIA	1500
6. Tatyana Yurievna Mazurina, Yana Sergeevna Matkovskaya, Klavdiya Lazarevna Neopulo, Tatiana Mikhailovna Rogulenko. STUDYING THE IMPACT OF THE DEPRECIATION POLICY ON THE DEVELOPMENT OF INNOVATION POTENTIAL OF INDUSTRIAL ENTERPRISES	1513
7. Mariana Sedliačiková, Zuzna Střoková, Miloš Hitka, Nikoleta Nagyová. EMPLOYEES VERSUS IMPLEMENTING CONTROLLING TO THE BUSINESS PRACTICE	1527
8. Veronika Yu. Chernova, Alexander M. Zobov, Ekaterina A. Degtereva, Vasily S. Starostin, Inna V. Andronova. SUSTAINABLE ECONOMY: EVALUATION OF FOOD SELF-SUFFICIENCY IN RUSSIA	1541
9. Tatiana Vitalievna Pogodina, Tatiana Viktorovna Muzhzhavleva, Natalya Leonidovna Udaltsova. STRATEGIC MANAGEMENT OF THE COMPETITIVENESS OF INDUSTRIAL COMPANIES IN AN UNSTABLE ECONOMY	1555
10. Zhanar Ordabekovna Tokhayeva, Botagoz Zhenisovna Almukhambetova, Bektur Keneshbayev, Kamshat Akhmetova INNOVATIVE PROCESSES' MANAGEMENT IN AGRICULTURE AND FOOD SECURITY: DEVELOPMENT OPPORTUNITIES	1565
11. Shazia Salamat, Niu Lixia, Sobia Naseem, Muhammad Mohsin, Muhammad Zia-ur-Rehman, Sajjad Ahmad Baig MODELING CRYPTOCURRENCIES VOLATILITY USING GARCH MODELS: A COMPARISON BASED ON NORMAL AND STUDENT'S T-ERROR DISTRIBUTION	1580
12. Sergey G. Belyaev, Nikolay I. Dorogov, Ivan A. Kapitonov, Svetlana N. Asabina. ENSURING COMPETITION IN THE CONTEXT OF GLOBALIZATION OF MARITIME TRANSPORT SERVICES	1597

13. Anna Mempel-Śnieżyk, Niki, Derlukiewicz, Tomasz Pilewicz, Małgorzata Zdon-Korzeniowska. CAN LOCAL GOVERNMENT IMPACT TRANSACTION COSTS OF ENTERPRISES?	1612
14. Marzena Wójcik-Augustyniak, Ewa Multan. EVALUATION OF ESCAPE ROOM COMPETITIVE POSITION IN POLISH MACRO REGIONS WITH 2D AND 1D STRATEGIC GROUP MAPS	1632
15. Gulnar Mirzayeva, Oguz Turkay, Nurhodja Akbulaev, Fariz Ahmadov. ECONOMICAL REFLECTIONS OF MEGA-EVENTS ON URBAN SUSTAINABLE DEVELOPMENT	1653
16. Edyta Bombiak. ADVANCES IN THE IMPLEMENTATION OF THE MODEL OF SUSTAINABLE HUMAN RESOURCE MANAGEMENT: POLISH COMPANIES' EXPERIENCES	1667
17. Małgorzata Koszewska, Maciej Bielecki. HOW TO MAKE FURNITURE INDUSTRY MORE CIRCULAR? THE ROLE OF COMPONENT STANDARDISATION IN READY-TO-ASSEMBLE FURNITURE	1688
18. Aida Tatibekova, Mukhtar Bubeyev. HOW REGULATION OF BANK CAPITAL ADEQUACY AND LIQUIDITY AFFECTS PRICING OF BONDS OF THE BANKS	1708
19. Eva Cihelková, Hung Phuoc Nguyen, Michal Fabuš, Kristína Čimová. THE EU CONCEPT OF THE "STRATEGIC PARTNERSHIP": IDENTIFYING THE "UNIFYING" CRITERIA FOR THE DIFFERENTIATION OF STRATEGIC PARTNERS	1723
20. Pedro Núñez-Cacho, Daniel Lorenzo- Gómez. THE INFLUENCE OF TIME ON THE INNOVATIVE BEHAVIOR OF THE FAMILY FIRMS VS NON-FAMILY FIRMS	1740
21. Teti Chandrayanti, Sulaeman Rahman Nidar, Asep Mulyana, Mokhammad Anwar. IMPACT OF ENTREPRENEURIAL CHARACTERISTICS ON CREDIT ACCESSIBILITY: CASE STUDY OF SMALL BUSINESSES IN WEST SUMATERA – INDONESIA	1760
22. Alan Karaev, Vadim Ponkratov, Andrey Masterov, Andrey Pozdnyaev, Nikolay Kuznetsov. THE ANALYSIS OF THE COMPARATIVE EFFICIENCY OF STATE SUPPORT FOR NATURAL GAS PRODUCTION: THE CASE OF SOME OECD AND BRICS COUNTRIES	1778
23. Ahmad Fathi Alheet, Yacoub Hamdan. EVALUATING INNOVATION-DRIVEN ECONOMIC GROWTH: A CASE OF JORDAN	1790
24. Wuryan Andayani, Dalila Daud. THE EFFECT OF CORPORATE GOVERNANCE STRUCTURE ON FINANCIAL DIFFICULTIES	1803
25. Aneta Wysokińska-Senkus. THE MODEL OF AN ORGANIZATION PERFORMANCE MEASUREMENT IN THE CONTEXT OF SUSTAINABLE SYSTEM MANAGEMENT	1819
26. Tomasz Stefaniuk. TRAINING IN SHAPING EMPLOYEE INFORMATION SECURITY AWARENESS	1832
27. Ivan Kulikov, Aleksandr Semin, Egor Skvortsov, Natalia Ziablitskaia, Ekaterina Skvortsova. CHALLENGES OF ENTERPRISE RESOURCE PLANNING (ERP) IMPLEMENTATION IN AGRICULTURE	1847
28. Yingfei Yang, Michal Fabus, Ki-Hyung Bae, Mengze Zhang. A DIAMOND MODEL BASED ANALYSIS FOR IMPROVING THE SUSTAINABLE COMPETITIVENESS IN EDUCATIONAL EXPORTS BY CHINESE COLLEGES AND UNIVERSITIES	1858

29. Miriam Jankalová, Radoslav Jankal. SELF-ASSESSMENT OF THE CORPORATE SOCIAL RESPONSIBILITY IN THE AREA OF POSTAL COMPANY	1872
30. Silas Mukwarami, Robertson K. Tengeh, Josephat Mukwarami. RESPONSIBLE ENTREPRENEURSHIP: IS THERE SCOPE FOR ADOPTION BY IMMIGRANT-OWNED BUSINESSES IN SOUTH AFRICAN TOWNSHIPS	1887
31. Monika Jasińska. SYNERGY - AN ENHANCEMENT OF LEARNING ORGANISATIONS UNDERGOING A CHANGE	1902
32. Marina Anokhina, Rakhat Abdrakhmanov, Yelena Evgenevna Gridneva, Milton Arrieta-López, Nuray Romanovna Dzhililova, Abel Meza-Godoy. FORMATION OF THE COMPETITIVE POTENTIAL OF THE AGRICULTURAL TERRITORIES	1921
33. Jarosław Stanisław Kardas. JOB CRAFTING IN INDIVIDUALISATION FIELDS OF COMPANY HUMAN RESOURCES	1937
34. Yang Jianfei, Jurate Cerneviciute, Rolandas Strazdas. THE SUSTAINABLE DEVELOPMENT OF RURAL TROUPES UNDER THE RURAL VITALIZATION STRATEGY IN CHINA	1951
35. Jacek Woźniak, Wioletta Wereda. KNOWLEDGE MANAGEMENT SIGNIFICANCE AND COMMUNICATION COMPLEXITY IN THE CONTEXT OF INNOVATIVE ENTERPRISES: CASE OF POLISH NEWCONNECT MARKET	1963
36. Radosław Korneć. THE ROLE OF STAKEHOLDERS IN SHAPING SMART SOLUTIONS IN POLISH CITIES	1981
37. Monika Wakula. THE IMPORTANCE OF ACCOUNTING AND REPORTING IN THE PROCESS OF FINANCE MANAGEMENT IN A BASIC UNIT OF THE TERRITORIAL GOVERNMENT	1996
38. Paitoon Chetthamrongchai, Sakapas Saengchai, Thitinan Chankoson. AN ECONOMIC ANALYSIS OF AGRICULTURAL PRODUCTION FUNCTION ON THE PADDY FIELDS OF THAILAND	2012
39. Ieva Meidutė-Kavaliauskienė, Gitana Dudzevičiūtė, Nijolė Maknickienė, Aidias Vasilis Vasiliauskas. THE RELATION BETWEEN AGING OF POPULATION AND SUSTAINABLE DEVELOPMENT OF EU COUNTRIES	2026
40. Chayanan Kerdpitak, Thitinan Chankoson, Kittisak Jermisittiparsert. THE CONTRIBUTION OF MACROECONOMIC FACTORS IN DETERMINING THE ECONOMIC GROWTH, EXPORT AND THE AGRICULTURAL OUTPUT IN AGRI-BASED ASEAN ECONOMIES	2043
41. Beata Domańska-Szaruga MATURITY OF RISK MANAGEMENT CULTURE	2060
42. Paitoon Chetthamrongchai, Kittisak Jermisittiparsert, Sakapas Saengchai. HOW THE NEXUS AMONG THE FREE TRADE, INSTITUTIONAL QUALITY AND ECONOMIC GROWTH AFFECT THE TRADE FROM ASEAN COUNTRIES	2079
43. Marian Oliński. EFFICIENCY OF THE PUBLIC FINANCIAL SUPPORT GRANTED TO SOCIAL ENTERPRISES	2095
44. Mariana Tesařová, Aleš Krmela, Iveta Šimberová. DIGITAL SUPPORT TO EXTERNAL SUSTAINABILITY COMMUNICATION IN SELF-ADHESIVE LABELLING INDUSTRY	2109

45. Lela Nurlaela Wati, Ramdany, Momon. DOES CORPORATE GOVERNANCE AFFECT FINANCIAL REPORTING QUALITY OF POLITICALLY CONNECTED FIRMS?	2126
46. Marzena Wójcik-Augustyniak. HOW TO MEASURE AND COMPARE THE VALUE OF ORGANIZATIONS. THE CASE STUDY OF HEIS	2144
47. Olga Yu. Voronkova, Margarita V. Melnik, Yulia V. Nikitochkina, Nadezhda M. Tchuykova, Alla A. Davidiyants, Svetlana V. Titova. CORPORATE SOCIAL RESPONSIBILITY OF BUSINESS AS A FACTOR OF REGIONAL DEVELOPMENT	2170
48. Andrei V. Glotko, Aleksandra G. Polyakova, Mariya Yu. Kuznetsova, Kseniya E. Kovalenko, Rustem A. Shichiyakh, Margarita V. Melnik. MAIN TRENDS OF GOVERNMENT REGULATION OF SECTORAL DIGITALIZATION	2181
49. Tatiana Morozova, Ravil Akhmadeev, Liubov Lehoux, Alexei Yumashev, Galina Meshkova, Marina Lukiyanova. CRYPTO ASSET ASSESSMENT MODELS IN FINANCIAL REPORTING CONTENT TYPOLOGIES	2196
50. Alexandr N. Dunets, Veronika V. Yankovskaya, Alla B. Plisova, Mariya V. Mikhailova, Igor B. Vakhrushev, Roman A. Aleshko HEALTH TOURISM IN LOW MOUNTAINS: A CASE STUDY	2213
51. Irina I. Frolova, Vladimir V. Nosov, Nadezhda B. Zavyalova, Aleksei E. Dorofeev, Tatiana M. Vorozheykina, Lyudmila I. Petrova. LABOR OPPORTUNISM AS A BLOCKING FACTOR FOR THE INNOVATIVE DEVELOPMENT OF INDUSTRIAL ENTERPRISES	2228
52. Aksana A. Turgaeva, Liudmila V. Kashirskaya, Yulia A. Zurnadzhlyants, Olga A. Latysheva, Irina V. Pustokhina, Andrei V. Sevbitov. ASSESSMENT OF THE FINANCIAL SECURITY OF INSURANCE COMPANIES IN THE ORGANIZATION OF INTERNAL CONTROL	2243
53. Kateryna Andriushchenko, Andrii Buriachenko, Olexandr Rozhko, Oksana Lavruk, Pavel Skok, Yaroslava Hlushchenko, Yelyzaveta Muzychka, Nataliia Slavina, Olena Buchynska, Viktoriia Kondarevych. PROVISION OF CONDITIONS OF SUSTAINABLE DEVELOPMENT OF ENTERPRISES IN THE CONTEXT OF DIGITAL TRANSFORMATION OF THE CROSS-INDUSTRIAL PARADIGM	2255
54. Natalia A. Prodanova, Natalia V. Savina, Vadim A. Dikikh, Yulianna I. Enina, Olga Yu. Voronkova, Vladimir V. Nosov. FEATURES OF THE COHERENT PRESENTATION OF INFORMATION IN ORDER TO PREPARE INTEGRATED CORPORATE REPORTING	2227
55. Tran Thi Bich Hang, Duong Thi Hong Nhung, Dinh Tran Ngoc Huy, Nguyen Manh Hung, Pham Minh Dat. WHERE BETA IS GOING – CASE OF VIET NAM HOTEL, AIRLINES AND TOURISM COMPANY GROUPS AFTER THE LOW INFLATION PERIOD	2282
56. Liudmila V. Kashirskaya, Alexey A. Sitnov, Dilmurod Ash. Davlatzoda, Tatiana M. Vorozheykina. KNOWLEDGE AUDIT AS A KEY TOOL FOR BUSINESS RESEARCH IN THE INFORMATION SOCIETY	2299
57. Andrey Poltarykhin, Zhanna Dibrova, Irina Kovaleva, Lidia Vasyutkina, Elena Potekhina, Olga Zinisha. WORLD EXPERIENCE IN THE APPLICATION OF ANTITRUST REGULATION AND COMPLIANCE SYSTEM	2313
58. Ewa Multan. ADJUSTING STUDENTS' COMPETENCES TO THE NEEDS OF MODERN BUSINESS SERVICES SECTOR	2326
59. Mykola Sidak, Ľuboš Cibák, Edita Hajnišová. INVESTMENT PROTECTION: DETERMINATION OF LEGAL ASPECTS WITH REFLECTING TO THE INNOVATIONS TO ENSURE SUSTAINABLE GROWTH OF THE SLOVAK REPUBLIC	2350
60. Tadeusz A. Grzeszczyk, Małgorzata Waszkiewicz. SUSTAINABLE INVESTMENT PROJECT EVALUATION	2363

61. Andrey Zahariev, Mikhail Zveryakov, Stoyan Prodanov, Galina Zaharieva, Petko Angelov, Silvia Zarkova, Mariana Petrova . DEBT MANAGEMENT EVALUATION THROUGH SUPPORT VECTOR MACHINES: ON THE EXAMPLE OF ITALY AND GREECE	2382
62. Alina Kulustayeva, Aigul Jondelbayeva, Azhar Nurmagambetova, Aliya Dossayeva, Aliya Bikteubayeva. FINANCIAL DATA REPORTING ANALYSIS OF THE FACTORS INFLUENCING ON PROFITABILITY FOR INSURANCE COMPANIES	2394
63. Elvira Ruzieva, Aliya Nurgaliyeva, Botagoz Duisenbayeva, Dina Kulumbetova, Mira Zhapbarkhanova. OPTIMIZATION AND MANAGEMENT OF THE LECTURE TRAINING STRATEGY FOR STUDENT	2407
64. Madina Serikova, Lyazzat Sembiyeva, Kuralay Balginova, Gulzhan Alina, Aliya Shakharova, Anar Kurmanalina. TAX REVENUES ESTIMATION AND FORECAST FOR STATE TAX AUDIT	2419
65. Astadi Pangarso, Endang Siti Astuti , Kusdi Raharjo, Tri Wulida Afrianty THE IMPACT OF ABSORPTIVE CAPACITY AND INNOVATION AMBIDEXTERITY ON SUSTAINABLE COMPETITIVE ADVANTAGE: THE CASE OF INDONESIAN HIGHER EDUCATION	2436
66. Alena Borisova, Madina Rakhimberdinova, Elvira Madiyarova, Inna Riazantseva, Natalia Mikidenko. STAFFING SEARCH AND RECRUITMENT OF PERSONNEL ON THE BASIS OF ARTIFICIAL INTELLIGENCE TECHNOLOGIES	2456
67. Robert Hutterski, Agnieszka Anna Huterska, Justyna Łapińska, Ewa Zdunek-Rosa. THE PROBLEM OF SAVINGS EXCLUSION AND GROSS SAVINGS IN THE NEW EUROPEAN UNION MEMBER STATES	2470
68. Małgorzata Kędzior-Laskowska POLISH ROAD FREIGHT TRANSPORT AND PROCESS OF INTERNATIONALISATION – SELECTED EFFECTS FOR QUALITY AND COMPETITIVENESS	2481
69. Mindaugas Laužikas, Aistė Miliūtė. IMPACTS OF MODERN TECHNOLOGIES ON SUSTAINABLE COMMUNICATION OF CIVIL SERVICE ORGANIZATIONS	2494
70. Tatiana Bondarenko, Alex Borodin, Makpal Zholamanova, Galina Panaedova , Tatiana Belyanchikova, Lira Gurieva. INVESTMENTS TO THE PETROCHEMICAL SECTOR: THE VALUE OF THE COMPETITIVENESS OF PETROCHEMICAL COMPANIES	2510
71. Arash Khalili Nasr, Maryam Kafizadeh Kashan, Abbas Maleki , Navid Jafari , Hamid Hashemi. ASSESSMENT OF BARRIERS TO RENEWABLE ENERGY DEVELOPMENT USING STAKEHOLDERS APPROACH	2526
72. Aina Caplinska, Manuela Tvaronavičienė. CREDITWORTHINESS PLACE IN CREDIT THEORY AND METHODS OF ITS EVALUATION	2542
73. Kiril Anguelov, Tsvetana Stoyanova, Rima Tamošiūnienė. RESEARCH OF MOTIVATION OF EMPLOYEES IN THE IT SECTOR IN BULGARIA	2556



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SELECTION OF THE INDICATORS TO MEASURE AN ENTERPRISE'S VALUE AND ITS CHANGES IN THE CONTROLLING SYSTEM FOR MEDIUM-SIZED ENTERPRISES

Daiva Tamulevičienė¹, Armenia Androniceanu²

¹Vilnius University, Faculty of Economics and Business Administration, Saulėtekio 9, LT-10222, Lithuania

²Bucharest University of Economic Studies, Faculty of Administration and Public Management, Piata Romana 6, 010374, Romania

²University of Social Sciences, Sienkiewicza St 9, Lodz and WSB University, Poland

E-mail: ¹daiva.tamuleviciene@evaf.vu; ²armenia.androniceanu@man.ase.ro

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Abstract. In a rapidly changing business environment, it is important for many enterprises to create value. Yet the aim to manage the enterprise by focusing on maximizing its value does not guarantee the growth of its value. Appropriate management instruments and systems have to be selected for this purpose. Introducing a controlling system helps to improve the functionality of company and the process of decision making as well as to increase the enterprise's value. When the main purpose of an enterprise is to create value, then it is necessary to have means to monitor, estimate and assess the value creation activity. According to both theory and practice, it is proposed to estimate the value of an enterprise and its changes by applying various indicators. Different indicators measure an enterprise's value changes differently. Also, the level of complexity of indicators calculation differs a lot. Taking these two criteria into account it is important for every enterprise to create an appropriate set of indicators measuring the enterprise's value and its changes. The article analyses the significance of measuring an enterprise's value in the controlling system, the diversity of indicators to measure an enterprise's value and the issues connected with their selection in medium-sized enterprises. The aim of the article is to develop a set of indicators measuring an enterprise's value and its changes that could be introduced in the controlling system for medium-sized enterprises. The research methods are the analysis of scientific literature, collection, comparison, classification and generalization of information, expert evaluation, a questionnaire survey of Lithuanian medium-sized companies' managers, accountants, financiers. During the expert evaluation it was found out that the following set of eight indicators measures the value and its changes in the controlling systems for medium-sized enterprises the best: Net profit, EBITDA, ROE, ROS, ROA, EVA, MVA, and TSR.

Keywords: controlling system; enterprise's value; measurement of enterprise's value; accounting-based indicators; shareholders' wealth-based indicators; medium-sized enterprises

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1. Introduction

In a rapidly changing business environment, it is important for many enterprises to create value. Increase of value has become the main managers' objective when ensuring the needs of current and future investors as well as balancing members' interests. Yet the aim to manage the enterprise by focusing on maximizing its value does not guarantee the growth of its value. The enterprise's strategy, management instruments, processes, activity assessment indicators have to be balanced by taking the main goal of the enterprise – the growth of its value – into account. Although the previous decades have been crucial for the management theory because various methods increasing management efficiency have been presented and applied in practice, yet most of them are oriented towards increasing a particular management function. Meanwhile, introduction of complex management systems oriented towards increase of enterprise's value allowing to coordinate the actions of all management links as well as to choose the most appropriate method and instruments was not developed.

One of such systems helping to spot the problems and deal with them in an integrated manner is controlling which could be called an innovative system applicable in the conditions of competitive market and dynamic business to achieve strategic and operational goals and ensure the growth of the enterprise's value in a long-term perspective. Introduction of such system could be a determining factor ensuring company's success. Studies conducted by many authors (Špac, Mašnja-Škare, 2009; Papp, Pajrok, 2010; Śliwczynski, 2011; Sestanj-Peric, Kupec, 2012; Bieńkowska, Zgrzywa-Ziemak, 2014; Vuko, Ovjan, 2013; Dobroszek, 2015; Perović et al., 2016; Todorović-Dudić et al., 2017 etc.) confirm that introducing a controlling system helps to improve the functionality of companies and the process of decision making as well as to increase the company's value growth.

When the main purpose of an enterprise is to create value, then it is necessary to have means to monitor, estimate and assess the value creation activity. According to both theory and practice, it is proposed to estimate the value of an enterprise and its changes by applying various indicators and methods. Their application possibilities, advantages and disadvantages have been studied by many authors (Rappaport, 1999; Hahn, Hungenberg, 2001; Scarlett, 2001; Sinevičienė, 2007; Dziškevičius, Michnevič, Ževžikova, 2008; Petravičius, 2008; Petravičius. Tamošiūnienė, 2008; Weber, Schäffer, 2008; Burksaitienė, 2009; Damodaran, 2012; Makutėnaitė, Gliubicas, Makutėnienė, 2014; Kumar 2016, Androniceanu, 2019, and others).

Controlling system oriented towards increase of an enterprise's value is more necessary for medium-sized and large companies rather than the small ones because the difficulties of management decisions usually increase as the company and its organizational and production structures grow. It is important to note that large enterprises usually have their own sets of indicators to measure the enterprise's value and its changes. Whereas medium-sized enterprises generally estimate their value through the prism of profit maximisation. Yet, the presence of profits does not guarantee that the enterprise is going to survive in the long run, since medium-sized enterprises often have to implement significant investments which can exceed the annual profit. These enterprises ought to use other indicators measuring their value and its changes as well. However, there is a lack of scientific and empirical studies focused solely on the indicators to measure value and its changes suitable for medium-sized enterprises. Therefore, it is important to analyse the main value-measuring indicators and determine which of them are the most suitable for medium-sized enterprises.

The object of the research is indicators for measuring an enterprise's value and its changes.

The aim of the article: is to develop a set of indicators measuring an enterprise's value and its changes that could be introduced in the controlling system for medium-sized enterprises.

The research methods are the analysis of scientific literature, collection, comparison, classification and generalization of information, expert evaluation, a questionnaire survey of Lithuanian medium-sized companies' managers, accountants, financiers.

2. The significance of measuring enterprises' value in the context of the controlling system

Instability of financial-economic environment, high level of competition, complicated technological processes, necessity to solve problems in short time, and other factors influence the decisions of enterprises' managers when considering the opportunity of introduction innovative management control systems. One of such systems is controlling. Controlling is an innovative system applicable in competitive and dynamic business conditions integrating planning, control, information provision, accounting and analysing activities, supporting management in achieving strategic and operational goals and ensuring creation of the enterprise's value in the long run. A properly designed controlling system can provide a variety of information on all the areas of activity, ensure the development of the enterprise, and increase its value.

The controlling system comprises different, however interconnected, subsystems and their elements whose interaction helps to make optimal decisions. Although there are many authors who analysed the elements of the controlling system there is no unanimous opinion neither on the controlling system structure nor on the elements comprising it and the interactions among them. Tamulevičienė, Subačienė (2019) studied the opinions of different authors on the structure of the controlling system and identified the necessary elements of the structural scheme of the controlling system. When creating the structural scheme of the controlling system all the characteristics specific to systems were maintained: 1) the system must be comprised of elements; 2) the system must consist of several hierarchical levels; 3) the elements must be related via connections; 4) the system must have boundaries; 5) the system must be dynamic; 6) the system must have a goal (Tamulevičienė, Subačienė, 2019, p. 132). Figure 1 presents a structured scheme of the controlling system architecture that depicts elements of the controlling system, its hierarchical levels, the relationships between them, its goal (results), and the boundaries of the system. The prepared structure of a controlling system shows a generalized view of a controlling system; therefore, it can be used as an exemplary structure for all types of companies planning to form a controlling system, regardless of their size, type of activity, legal form, or other features.

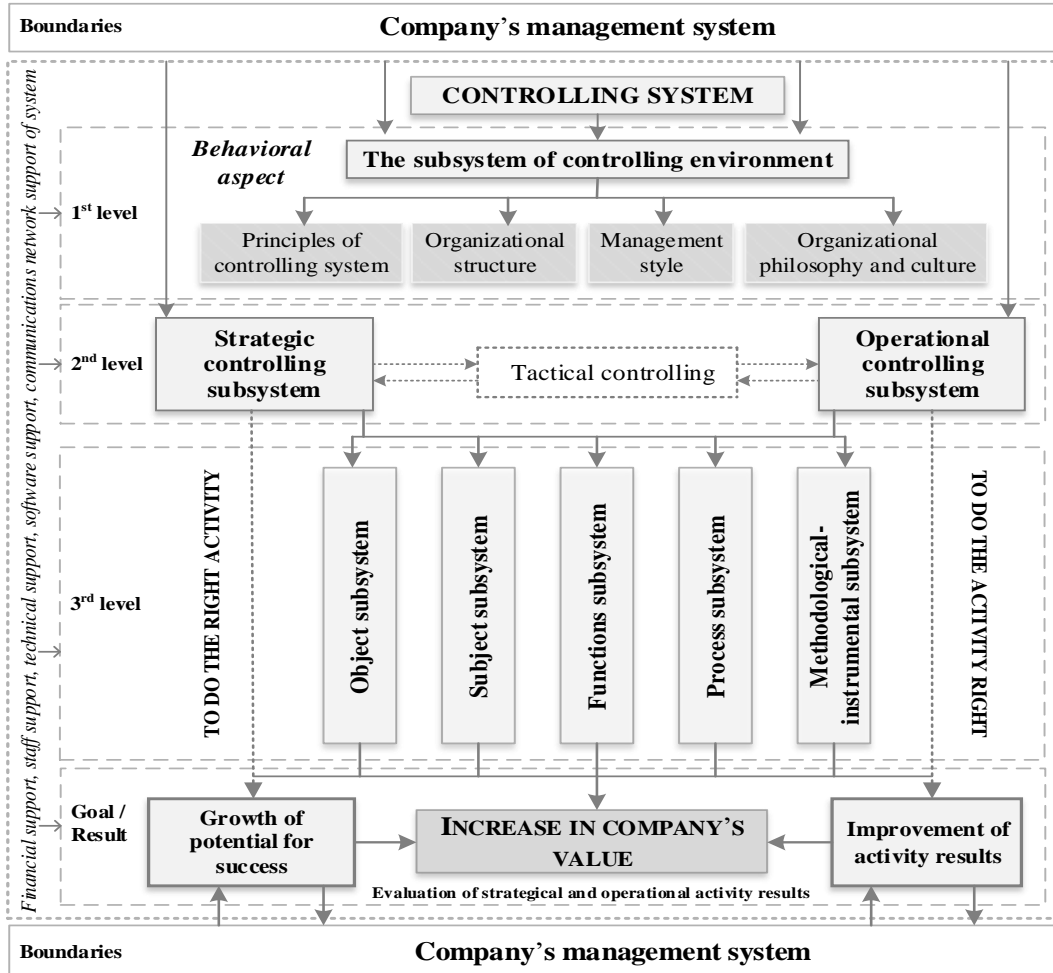


Figure 1. Structural scheme of the controlling system

Source: Tamulevičienė, Subačienė, 2019, p.141

Even though every system is comprised of various elements of different significance, yet the *goal* of the system or the sought *result* should be considered the most important element of the system. Every system has to have a clearly measurable outcome based on which the effectiveness of the system can be assessed. As can be seen from the Figure 1, the goal of the controlling system is expressed through a specific result – an increase in the value of the enterprise. How well the controlling system achieves this goal must be evaluated in two aspects: 1) in the prism of the strategic controlling subsystem as the growth of potential success; 2) in the prism of the operational controlling subsystem as an improvement of the operational performance. In order to increase the possibilities of companies to create value, it is important to monitor and improve the lower level measures indicating the company's value and its changes. This requires constant systematic assessment of the company's activity both in operational and in strategic levels. The indicators and criteria applicable for assessment of the operational and strategic activity may vary depending on the company. The enterprises can introduce both individual indicators and sets of indicators. Systems of indicators measure the results of a company's strategic and operational activity better than individual indicators yet the view towards the efficiency of systems of indicators differs (Tamulevičienė, 2016).

And even though it is important to assess the operational and strategic activities indicators, the final effectiveness of the controlling system should be determined with regards to the changes in an enterprise's value size. Value, as the essential criterion to measure the effectiveness of a modern enterprise activity, is emphasized in various contexts in the works by many authors (Rappaport, 1999; Hahn, Hungenberg, 2001; Scarlett, 2001; Sinevičienė, 2007; Petravičius, 2008; Džikevičius, Michnevič, Ževžikova, 2008; Venanzi, 2010; Damodaran, 2012; Markevičiūtė, Jucevičius, 2013; Makutėnaitė, Gliubicas, Makutėnienė, 2014; Kumar, 2016; Fijałkowska, Macuda, 2017; Kobiela-Pionnier, 2019; Hilkevics, Semakina, 2019; Androniceanu, Tvaronavičienė, 2019; Mura et al., 2017 and others). As Scarlett (2001) notes, for a while there has been an increasing pressure on corporate executives to measure, manage and report the creation of shareholders value on a regular basis. Increase of value has become the main managers' objective when ensuring the needs of current and future investors as well as balancing members' interests. As Džikevičius, Michnevič, Ževžikova (2008) notes, the changes in value in a certain period is the criterion of an enterprise's effectiveness assessing nearly all the information related to its activity. Cican, Lala-Popa, Anis (2013) stress the harmony of strategic and operational activity as the essential factor ensuring the value growth.

3. Diversity of indicators measuring an enterprise's value and its changes

When the main purpose of an enterprise is to create value, then it is necessary to have means to monitor, estimate and assess the value creation activity. According to both theory and practice, it is proposed to estimate the value of an enterprise and its changes by applying various indicators and methods that fall into two main groups: 1) *traditional ones*, accounting-based; 2) *new ones*, shareholders' wealth-based. Estimations from both groups consider maximisation of shareholders' interests as the key goal of the enterprise, regardless of the different principles used in estimations. As Scarlett (2001) notes, it does not mean that by creating value for the shareholders other participants, for example employees, customers, suppliers, and community, are ignored. On the contrary: the enterprises that create value make decisions that tend to strike a fair balance among the participants. Becker (1990, 2011) in particular supported this approach by creating and advocating a controlling concept based on *the orientation towards added value and optimization of stakeholders' interests*.

However, his state that prioritizing external stakeholders, for example customers, when the interests' of the whole cannot be fully aligned, is open to debate. Many authors who analyse the issues of estimation of the created value (Rappaport, 1999; Venanzi, 2010; Darškuvienė, 2013, and others) admit that it is the shareholders rather than other participants who are the most important ones in this process because those enterprises which do not meet its shareholders' demand to grow face the risk of losing their capital. The creator of the *cognition oriented* controlling concept, Lingnau (2004, 2009), supports this position and emphasizes that it is of vital importance to be aware of the interests of every shareholder group, strike a proper balance among them and ensure the growth of the shareholders' value. Taking this into account, it can be said that a controlling system oriented towards the growth of an enterprise's value faces a challenge of how to maximize the shareholders' wealth and strike a balance among the interests of the rest of the participants. In order to determine the changes of an enterprise's value, it is important to measure them properly. Yet not all measurements assess the activity results and their impact of the shareholders' wealth as well as of the growth of the enterprise's value equally precisely. This is particularly true of the group of accounting-based measurements of which the most important ones are presented in the Tables 1 and 2.

Table 1. Absolute accounting-based indicators for measuring an enterprise's value and its changes and their description

Indicator	Description
Net Profit	shows the final result of the enterprise's activity which is estimated by subtracting all expenditures, including income tax, from the revenue
Earnings Before Interest and Taxes, (EBIT)	shows how much profit did the enterprise make before assessing the enterprise's funding policies and the impact of the income tax on profits
Earnings Before Interest, Taxes and Amortization, (EBITA)	shows how much profit did the enterprise make before assessing the enterprise's funding policies, amortization, and the impact of the income tax on profits
Earnings Before Interest, Taxes Depreciation and Amortization, (EBITDA)	shows how much profit did the enterprise make before assessing the enterprise's funding policies, amortization, depreciation, and the impact of the income tax on profits

Source: compiled by the authors based on Weber, Schäffer (2008); Damodaran (2012); Makutėnaitė, Gliubicas, Makutėnienė (2014)

As it can be seen from the Table 1, all absolute accounting-based measurements with the purpose to determine the changes in an enterprise's value are related to profit and its various modifications. These indicators are very popular because they clearly show the changes in the shareholders' capital due to changes in the activity results. Yet these measurements are criticized. As Weber, Schäffer (2008), Makutėnaitė, Gliubicas, Makutėnienė (2014), and others state, the net profit and its other expressions do not assess the cash flows; only explicit costs (such as materials, salaries, interests, taxes, etc.) are considered as expenditures whereas cost of capital is not taken into account; alternative accounting methods used have an impact on the volume of the net profit. Also, growth of the profit does not necessarily mean the creation of value for the shareholders. The value increases only if the enterprise is more profitable than the amount a current shareholder or a potential investor might receive from alternative investments of similar risks. When measuring the changes of the shareholder's value, this drawback is eliminated by applying relative indicators because these indicators measure the ratio of the profit with a selected criterion rather than the absolute profit volume (see Table 2).

Table 2. Relative accounting-based indicators for measuring an enterprise's value and its changes and their description

Indicator	Description
Return on Equity, (ROE)	is measured by dividing the net profit from equity; shows the profit created by equity and managers' work effectiveness when using this equity
Return on Assets, (ROA)	is measured by dividing the net profit from all assets. This indicator shows how effective assets, obtained by the funds from equity and debt capital, are managed, i.e. determines how much net profit goes to one euro of assets. Another modification of how to apply this indicator is possible: in this case ROA is measured by dividing the Earnings before interest and taxes from all assets, i.e. operating profit after eliminating the impact of taxes and interests are used for assessment
Return on Investment, (ROI)	shows how effectively investments are used. Taking into account the fact that both equity and debt capital can be considered as investments, ROI is usually estimated by dividing net profit from the sum of equity and long-term liabilities. Investment is a long-term process; thus short-term liabilities are usually not taken into account when measuring ROI. ROI can be also measured as the difference of the benefits from investments and the sum of investments divided from the sum of investments
Return on Sales, (ROS)	estimated by dividing the net profit from the sales revenue. Shows how successfully can profits be created from the sales revenue from the shareholders' perspective. ROS can be estimated by including into the analysis the Earnings before interest and taxes instead of net profit.
Return on Capital Employed, (ROCE)	is estimated by dividing Earnings before interest and taxes from the difference between the total assets and current liabilities. It shows the level of the enterprise's functionality and potential development as well as abilities of managers to use equity and long-term liabilities.
Earnings per Share, (EPS)	estimated by dividing the net profit for the shareholders of ordinary shares (i.e. after subtracting the dividends from preference shares) from the average number of ordinary shares in circulation. It is an indicator of the enterprise's attractiveness to which investors pay a special attention.

Source: compiled by the authors based on Weber, Schäffer (2008); Damodaran (2012); Mackevičius, Giriūnas, Valkauskas (2014); Masa' deh, et al. (2015); Tamulevičienė (2016); Tamulevičienė, Mackevičius (2019)

Although the measurements provided in the Table 2 are widely spread because it is relatively easy to measure them and the data is accessible, they have some fundamental weaknesses. First of all, as Rappaport (1999), Christauskas, Kazlauskienė (2009), Venanzi (2010), Horváth (2011), Makutėnaitė, Gliubicas, Makutėnienė (2014), and others state, these indicators can only be partially associated to the creation of value because they, like the absolute accounting-based measurements, do not assess the cash flows, economic life of assets and, most importantly, capital costs. Also authors list more drawbacks of the accounting-based measurements, for instance, problems evaluating an enterprise's economic effectiveness due to certain aspects of the enterprise's accounting policy that influences calculation of profit; the changes in the value of money due to inflation; the needs of capital needed for growth and risks that appear in different departments of an enterprise are not taken into account; there is a slight correlation between the changes in the value of assets and changes in the stock market, etc.

Taking all this into account it is safe to state that it is only partially possible to reliably assess the changes in an enterprise's value creation (losses) by using traditional accounting-based methods. Thus scientists (Rappaport, 1999; Hahn, Hungenberg, 2001; Scarlett, 2001; Sinevičienė, 2007; Dziškevičius, Michnevič, Ževžikova, 2008; Petravičius, 2008; Petravičius. Tamošiūnienė, 2008; Weber, Schäffer, 2008; Burksaitienė, 2009; Damodaran, 2012; Makutėnaitė, Gliubicas, Makutėnienė, 2014; Kumar 2016, and others) offer to apply the measurements from another group, the shareholders' wealth-based one, besides the methods from the first group; the most important of these measurements are provided in the Tables 3 and 4.

In the Table 3 absolute indicators assessing the size of the enterprise's value and its changes are provided; the purpose of some of these indicators, for example Economic value added, Cash value added, Equity spread, is to measure the changes in the enterprise's value in a short-term one year period. Whereas the purpose of Market value added and Shareholder value added is to determine the changes in the enterprise's value in the long run. Discounted cash flow and Shareholder value at risk measurements can be applied both during the short run and the long run, regardless of the selected assessment period.

Table 3. Absolute shareholders' wealth-based indicators for measuring an enterprise's value and its changes and their description

Indicator	Description
Economic Value Added, (EVA)	measured as the difference between net operating profit after taxes (NOPAT) and cost of invested or operating capital. The positive value of EVA means that a company increases its value whereas the negative value means that the value is decreasing. The EVA indicator can be estimated for the enterprise, department, production line or other smaller unit of the enterprise, also, can show the input of every chain of the business in the creation of value
Market Value Added, (MVA)	shows the expected success of the enterprise through the additionally created market value. From the market position the MVA indicator is measured as the difference between total market value and invested capital. The total Market value is determined by adding the share price multiplied by their number and book value of the debt capital. From the enterprise's position the MVA indicator is estimated as the current value of all future EVA indicators. The value added of the market can either be created or lost. Enterprises seek to maximize the created value added of the market
Cash Value Added, (CVA)	shows the residual amount of the cash flows generated from the investments. Estimated as the difference between the adjusted operating cash flow and the product of the total investment and weighted average cost of capital. If CVA is applied together with Cash flow return on investment (CFROI), then the cash value added can be estimated as the difference between Cash flow return on investment and weighted average cost of capital multiplied by the amount of the total investments. Positive value of the CVA shows the potential of an enterprise to create value
Shareholder Value Added, (SVA)	evaluates the capital gains for the shareholders and shows the difference between the estimated share capital and the book value of the share capital. When estimating the value of the share capital, all free cash flows of the future periods are discounted and the weighted average cost of capital is considered as the discount rate. The amount received is adjusted by adding the value of the assets used for other than the principal activity and subtracting the volume of the debt capital
Equity Spread, (ES)	estimated by multiplying the amount of the equity by the difference between the Return on equity (ROE) and required Return on equity. Positive value of the ES shows that the company is creating value whereas the negative one shows that the value is being lost
Discounted Cash Flow,	the value of an enterprise is determined by taking into account the enterprise's abilities to generate cash flows in the future which are discounted into present value. The DCF method is universal since it can be modified in different

(DCF)	ways by taking the sought goal into account and using the net profit, dividends, interest, etc. instead of the cash flows when calculating. The longer the period for predicting the future CF, the more difficult the discounting process. Usually the period for predicting is divided into several stages in the last of which the constant discount rate is selected
Shareholder Value at Risk, (SVR)	with the help of Monte Carlo simulation method, distribution of the enterprise's cash flow Net present value (NPV) is estimated. The SVR evaluates uncertainty, i.e. the value of an enterprise is presented in the form of probability distribution by assessing possible fluctuation margins of the predicted variables. The method presents not only the enterprise's value but also other statistic characteristics which reflect the risk of the enterprise's activity

Source: compiled by the authors based on Rappaport (1999); Hahn, Hungenberg (2001); Scarlett (2001), Žaptorius, Garbanovas (2006); Sinevičienė (2007); Dzikevičius, Michnevič, Ževžikova (2008); Petravičius (2008); Weber, Schäffer (2008); Damodaran (2012); Makutėnaitė, Gliubic, Makutėnienė (2014); Kumar (2016); Mert, Erkan Dil (2016)

Although absolute shareholders' wealth-based indicators for measuring an enterprise's value are very informative since they allow to measure the changes in the value in monetary terms, they are not always applied in order to compare several alternatives for making decisions. In this case relative indicators are more appropriate. Table 4 shows three principal relative shareholders' wealth-based indicators for measuring an enterprise's value and its changes and their description.

Table 4. Relative shareholders' wealth-based indicators for measuring an enterprise's value and its changes and their description

Indicator	Description
Cash Flow Return on Investment, (CFROI)	estimated as the ratio of the difference between the total cash flows and economic depreciation with the invested capital. In order to determine the amount of each of these indicators, additional adjustments are made by evaluating non-monetary items, inflation, capital expenditure, economic lifetime of the assets and other aspects. In its more sophisticated form, CFROI incorporates the principles of the Internal rate of return (IRR) concept. It presents the discount rate that discounts the future annual cash flows that are expected to arise over the average life of the company's assets, back to current cash value of the enterprise's net operating assets. Yet, although the increase of the Cash flow return on investment is considered as a positive thing because of slower growth (lower investments) or higher risk the increase in profitability does not ensure the creation of value. The CFROI indicator is usually used to evaluate the profitability in the long run, however after modifying the formula it can also be used for a period of one year
Total Shareholder Return, (TSR)	shows the rate of return earned by a shareholder through a combination of price changes and dividends received. One year TSR indicator is estimated by subtracting the initial price of a share from the current price of a share, adding the dividends for a share and dividing the result from the initial price of a share. By modifying the formula, the method can also be applied to evaluate the profitability of shareholders' equity in a longer period
Annual Economic Return, (AER)	determined as the ratio between the market value of equity at the end of the year by subtracting the externally raised capital and adding dividends and market value of equity at the beginning of the year. In the calculations, the externally raised capital, the dividends paid and the value of equity at the beginning of the year are specified by taking the cost of capital rate into account. The measurements are based on evaluation of two alternatives. In the first case (denominator of the indicator) it is assumed that an enterprise is liquidated when the shareholders pay the amount equal to the market value of the equity which they can later use for other investments and receive adequate return which is usually equated to the cost of capital rate. In the second case (numerator of the indicator) the activity of the enterprise is continued as the shareholders receive dividends and, if necessary, the external capital is increased. Positive ratio of these alternatives of the market values of an enterprise shows that the enterprise is creating value; whereas a negative ratio shows that the value is being lost.

Source: compiled by the author based on Rappaport (1999); Hahn, Hungenberg (2001); Scarlett (2001); Petravičius (2008); Weber, Schäffer (2008); Damodaran (2012); Makutėnaitė, Gliubic, Makutėnienė (2014)

Without the indicators shown in Tables 3 and 4, more measurements to determine the changes in the value of an enterprise can be found in the scientific literature, for instance, Value return on investment (VROI) that evaluates the created value for one discounted euro from investments; Total business return (TBR) that evaluates the capital gains and the dividends paid for the shareholders; Earnings less riskfree interest charge (ERIC) that allows to determine the changes in value and reveal what caused them by assessing whether they were influenced by managers' effectiveness or favourable conditions. Yet the possibilities of wider application of these measurements in practice have not been studied and described in detail. And although the shareholders' wealth-based

measurements do not have the drawbacks characteristic to accounting-based indicators since they evaluate the cost of capital, the impact of inflation for the cash flows, and other aspects, each of the presented methods have certain limitations. Henceforth the statement that only the indicators from this group or a particular indicator measure the changes in an enterprise's value adequately is incorrect. Also, as Venanzi (2010) notes, there is little information and empirical studies results on the effectiveness of different measurements and the results are inconsistent because the published results directly depend on the authors' commercial interests. On one hand, during the last two decades consultancy firms have been constantly stating that their approaches are better while the ideas proposed by their competitors do not measure the value fully. On the other hand, enterprises have implemented various shareholders' wealth-based measurements in their practice by choosing different methods all the time which shows that more in-depth studies are needed to create a proper measurement of an enterprise's value changes regardless of the group to which the indicators are attributed.

It is important to note that large enterprises usually have their own sets of indicators to measure the enterprise's value and its changes. Whereas medium-sized enterprises generally estimate their value through the prism of profit maximisation. Yet, the presence of profits does not guarantee that the enterprise is going to survive in the long run, since medium-sized enterprises often have to implement significant investments which can exceed the annual profit. However, medium-sized enterprises have fewer opportunities to attract loan capital in favourable conditions than the large ones. Thus these enterprises have to use other indicators measuring their value and its changes.

Besides the study by Horváth (2011), there are barely no scientific studies focused exceptionally on tools to measure the value and its changes of medium-sized enterprises. In this study, the author revealed how do strategic and operational controlling contribute to the increase of the value in medium-sized enterprises and described the aspects of how to measure the changes in value creation that are characteristic exceptionally to medium-sized enterprises. According to the author, the medium-sized enterprises should focus not only on operational approach, oriented towards introduction of accounting-based indicators, but also on strategic approach and in order to measure value introduce indicators measuring shareholders wealth – the essential one among which, is the Economic value added indicator.

Nonetheless, it is impossible to unambiguously state which indicators are appropriate to measure the value of medium-sized enterprises and its changes after taking into account all the indicators, their advantages and disadvantages, level of complexity of calculations as well as specific introduction conditions. In order to offer a set of indicators to measure an enterprise's value and its changes which could be introduced in the controlling system of medium-sized enterprises, an empirical study was conducted.

3. Methodology of the empirical study

The empirical study was comprised of two stages: 1) expert survey; the aim of this stage was to determine which and how many of the specified indicators are the most appropriate to measure the value of medium-sized enterprises as well as its changes in the controlling system; 2) survey of the Lithuanian medium-sized enterprises' managers, senior accountants, senior financial officers and other specialists; the aim of this stage was to assess the validity of the set of indicators to measure the value and its changes selected by the experts.

The expert evaluation is a procedure that makes it possible to harmonize the opinions of different experts and make a mutual decision (Augustinaitis et al., 2009). The expert survey method was chosen because of the lack of reliable quantitative and qualitative information which allows one to find a scientific basis for the analysed phenomenon. The non-probability sampling technique integrating judgemental, convenience and snowball sampling methods was applied for expert evaluation. Taking into account the sample size recommended in the

literature (Pranulis, Dikčius, 2012; Tidikis, 2003; Augustinaitis et al., 2009), thirteen experts were selected for the expert evaluation.

The expert evaluation survey was carried out in September 2017 in a form of a questionnaire survey. The questionnaire was comprised of four parts – every one of which presents various indicators to measure an enterprise's value and its changes – divided into four groups based on two criteria: 1) indicators are absolute/relative; 2) calculation of indicators is accounting-baseshareholders' wealth-based. The experts were asked to: 1) list the presented indicators from every group in the order of importance by indicating which are appropriate to measure the value of medium-sized enterprises and its changes; 2) specify the optimum number of indicators from every group by determining the value of medium-sized enterprises with regards to the data collection and calculation complexity and to how precisely the value has been measured.

After receiving the expert survey results, the agreement of expert estimates was assessed by applying the coefficient of concordance. The statistical functions of the Microsoft Excel application were applied to process and analyse the expert survey data; the procession of data was based on the methods of descriptive and inferential statistics.

The second stage of empirical study consisted of the survey of medium-sized enterprises. When carrying out a questionnaire survey it is important to determine the sample size and choose a proper sampling method. Since the object of the study is the validity of the set of indicators to measure the value and its changes in Lithuanian medium-sized enterprises, the population consists of all medium-sized enterprises operating in Lithuania. According to the definition provided in the Law on the Development of Small and Medium-sized Businesses of the Republic of Lithuania (2017), a medium-sized enterprise is a business that meets the conditions laid out in the article 3 of the law: 1) the number of employees is below 250; 2) financial data corresponds to at least one of the following conditions; a) annual revenue does not exceed 50 million EUR, b) carrying value of the assets does not exceed 43 million EUR. At the beginning of 2017, there were 2,425 companies that met these conditions.

Knowing what the population is the sample size may be estimated and on the basis of its study results one can make assumptions on the population as a whole. When estimating the sample size, a 5% margin of error is usually selected. However, knowing that only managers and top level experts were supposed to take part in the study and it is often problematic to reach them, the margin of error was increased to 10%. According to Kardelis (2016), in order to determine the sample size one has to take the aim of the study into account and determine how accurately they want to prove the statement. Accuracy of 10% is sufficient in order to evaluate the trends of validity of the set of indicators to measure the value and its changes in Lithuanian medium-sized enterprises. With the population of 2,425 and the margin of error of 10%, then the sample is 93 respondents.

After identifying the necessary number of respondents, a method of their selection was determined. Taking the specific nature and sample size of the study into account, the group of respondents was selected by applying simple random sampling method, i.e., all randomly selected medium-sized enterprises were surveyed without distinguishing them based on any features (type of activity, legal form, etc.). The studied group was chosen by selecting the surveyed companies from the prepared list of Lithuanian medium-sized enterprises by following a certain pattern. If the population is 2,425 enterprises and the sample is 93 enterprises then every 27th company should be surveyed. However, the possibility that not all respondents may agree to take part in the survey was taken into account. Then, even if a small portion of the results were not received, the margin of error would increase even more. Therefore, every 20th enterprise was surveyed and the number of respondents increased to 123 respectively. The questionnaire was uploaded to the online surveying website <http://www.manoapklaus.lt/>. A request to fill out the questionnaire and a link to it were e-mailed to the companies. The survey was conducted in April-May 2018. 95 respondents took part in it. On the basis of the prepared methodology of the study, 123 surveys were sent out; 77% of them were completed.

4. The results of the expert evaluation and survey of medium-sized enterprises

As it has already been mentioned, various indicators measuring the value and its changes divided into four groups were provided to the experts. The first group contained four absolute accounting-based indicators to measure the enterprise's value and its changes: 1) Net profit; 2) EBIT; 3) EBITA; 4) EBITDA. The experts were supposed to rank all the indicators; 4 points mean that the indicator is the most appropriate (first position in rank), whereas 1 point means that it is the least appropriate (last position in rank). The aggregated expert evaluation results are provided in the Figure 2.

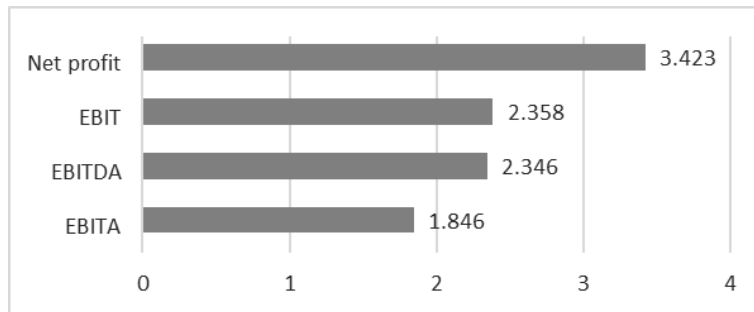


Figure 2. Suitability of absolute accounting-based indicators measuring the enterprise's value and its changes to determine the value changes in medium-sized enterprises

The Net profit indicator received the highest number of positive assessments: its average mark was 3.423 out of 4. As many as seven experts gave this indicator the first position and another five gave it the second position. Earnings before interest and taxes (EBIT) and Earnings before interest, taxes, depreciation and amortization (EBITDA) indicators' were rated as nearly equally valid. The EBIT indicator has a bit higher ranking in terms of average points, yet the mode and median of this indicator are equal to 2 whereas the mode and median of the EBITDA indicator amounts to 3 points. That shows that more experts gave the latter a higher mark. EBITA indicator received the least points (mean was equal to 1.846; mode and median are equal to 2). Such evaluation results from the fact that when one estimates the profit, amortized intangible assets value is eliminated, yet the depreciation of fixed assets is not eliminated. Even though Weber, Schäffer (2008) assessed introduction of this indicator to determine changes in an enterprises' value positively, according to other authors this indicator is not crucial. The results of expert evaluation confirm this. Agreement of expert estimates is not high ($W=0.2633$; after introducing consistent ranks $W=0.2695$). However the agreement of expert estimates can be considered sufficient because the estimated χ^2 value is 10.269 whereas the critical value is 7.815 (the p value $0.0164 < 0.05$).

Another thing that the experts were asked to assess was the optimum number of the indicators from this group necessary to determine the medium-sized enterprises value changes. Six experts specified that application of one indicator is enough because every indicator of this group reflects the same result, which is profit, only expressed differently; five experts said that two indicators can be introduced since it is easy to estimate them and the shareholders' capital changes would be reflected better due to the changes in activity results. It should be noted that one expert claimed that introduction of specified indicators to determine the value changes in medium-sized enterprises is hardly appropriate since profit indicators are only partially related to the size of the enterprise's value. Taking the statistical data evaluation results into account (the average number of recommended indicators from this group is 1.62 whereas the mode and median are equal to 2) it is recommended to apply the following two indicators: Net profit and Earnings before interest, taxes, depreciation and amortization (EBITDA).

The second group of indicators contained six relative accounting-based indicators to measure the enterprise's value and its changes: 1) ROE; 2) ROA; 3) ROI; 4) ROS; 5) ROCE; 6) EPS. Respectively, the experts had to rank the indicators from 6 (the most appropriate) to 1 (the least appropriate) points.

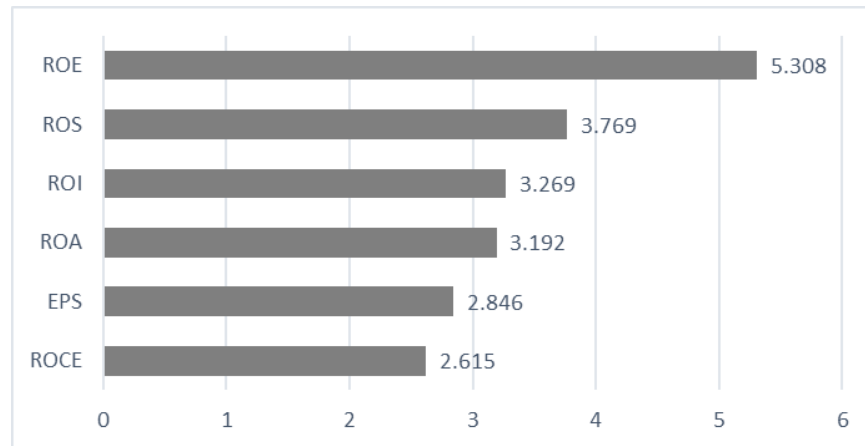


Figure 3. Suitability of relative accounting-based indicators measuring the enterprise's value and its changes to determine the value changes in medium-sized enterprises

As we can see from the Figure 3, according to the experts the most suitable indicator for medium-sized enterprises is Return on equity (ROE) whose mean accounts to 5.308 out of 6 (mode and median account to 6). As many as nine experts said this is the most suitable indicator whereas the other five gave it the second position. The second place goes to Return on sales (ROS) (mean 3.769; mode and median 4); the third place goes to Return on investment (ROI) whose mean accounts to 3.269 (whereas mode and median are 3). Return on assets (ROA) had a similar mark with the mean accounting to 3.192. However, the mode and median of the latter indicator are equal to 4 which shows that more experts gave ROA more points than ROI. Agreement of expert estimates can be considered sufficient because the coefficient of concordance is 0.40034, the estimated χ^2 value is 26.02 whereas the critical value is 11.07 (the p value $0.00008 < 0.05$).

When analysing the experts' assessment on the optimum number of the indicators from this group it was determined that opinions tend to vary a lot. For instance, one expert recommended not to introduce any indicators from this group because profitability indicators are only partially related to the size of the enterprise's value. Whereas another expert recommended introducing all six indicators from this group because the processes of data collection and profitability indicators calculation are not difficult yet the results may provide comprehensive and complex information on the enterprises' value. Even though the opinions of some experts varied but statistical assessment of the data shows that the average number of indicators the experts recommended is 2.69 whereas the mode and median are 3. Taking the results into account it is recommended to introduce three indicators from this group into the medium-sized companies controlling system: Return on equity (ROE), Return on sales (ROS) and Return on assets (ROA). Even though the mean of the latter indicator was lower than that of the Return on investment (ROI) by 0.077 point but its mode and median are higher. Also, one expert substantiated her choice to introduce more than one indicator from this group by saying that essentially only one indicator, ROE, matters, however then the information on why this indicator has changed is lost. According to the expert, a set of three indicators (ROE, ROA and ROS), reveals the changes appearing due to changes in the capital structure, assets turnover and sales and provides comprehensive information. The third group of indicators provided for experts to evaluate was the absolute shareholders' wealth-based indicators to measure an enterprise's value and its changes: 1) EVA; 2) MVA; 3) CVA; 4) SVA; 5) ES; 6) DCF; 7) SVR. The results of their suitability to determine the value changes in medium-sized enterprises are provided in Figure 4.

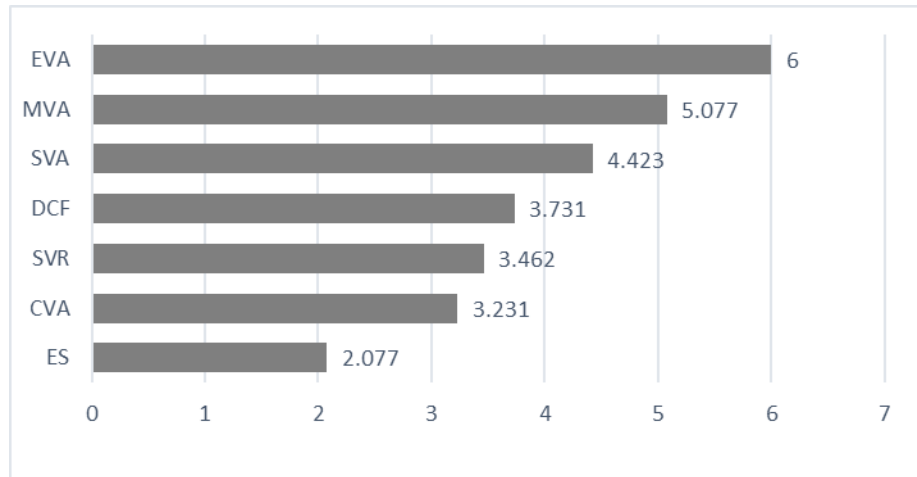


Figure 4. Suitability of absolute shareholders' wealth-based indicators measuring the enterprise's value and its changes to determine the value of medium-sized enterprises

Experts were almost unanimous in their choice to give the first place to the Economic value added (EVA) indicator giving it 6 points out of 7 (mode and median account to 7). The second place goes to the Market value added (MVA) indicator (mean 5.077; mode and median 5). The third place goes to Shareholder value added (SVA) (mean 4.423; mode 3; median 4). The agreement of expert estimates is sufficient (W is 0.357; the estimated χ^2 value is 27.83 whereas the critical value is 12.59; the p value $0.0001 < 0.05$).

The opinions on the optimum number of indicators in this group were rather similar. The highest number of respondents – eight – said that the optimum number of the indicators from this group is two when choosing to determine the enterprise's value in different periods (in one year and in the long run). The indicators from this group have difficult data gathering and calculation procedures and introducing more of them would be excessive, according to the experts. Taking the overall experts' evaluation results into account (average optimum number of the indicators from this group is 2.38; the mode and median are 2) it is recommended to introduce two indicators from this group in the medium-sized enterprises controlling system: 1) Economic value added (EVA) which could be used as a measure to determine the enterprise's value and its changes in the short run (one year); 2) Market value added (MVA) which is related to measurement of the value creation (losses) in the long run. The last group the experts were asked to evaluate was comprised of three indicators from the group of relative shareholders' wealth-based indicators measuring the enterprise's value and its changes: 1) CFROI; 2) TSR; 3) AER. Figure 5 shows the results of this assessment.

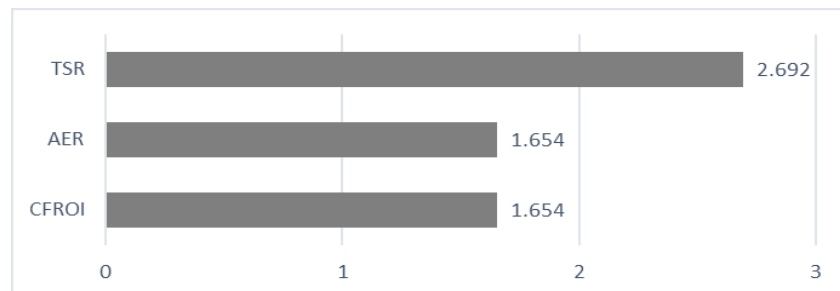


Figure 5. Suitability of relative shareholders' wealth-based indicators measuring the enterprise's value and its changes to determine the value of medium-sized enterprises

As we can see from the Figure 5, the experts evaluated the Total shareholder return (TSR) indicator the most positively and on average gave it 2.692 points out of 3 (the mode and median amount to 3). The experts gave the same score to Total shareholder return (AER) and Cash flow return on investment (CFROI); on average they received 1.654 points. When asked to provide the optimum number of indicators from this group, most of the experts recommended introducing only one. According to them, these indicators have difficult data gathering and calculation procedures and introducing more of them would be excessive. Thus medium-sized enterprises are recommended to introduce only Total shareholder return (TSR) to whom the experts gave the highest score. Agreement of expert estimates can be considered sufficient because the coefficient of concordance is 0.359, the estimated χ^2 value is 9.346 whereas the critical value is 5.99; the p value $0.00934 < 0.05$.

To conclude the results of the expert evaluation, the following set of indicators to measure a medium-sized enterprise's value and its changes is recommended to be introduced into the controlling system: 1) Net profit; 2) Earnings before interest, taxes, depreciation and amortization (EBITDA); 3) Return on equity (ROE); 4) Return on sales (ROS); 5) Return on assets (ROA); 6) Economic value added (EVA); 7) Market value added (MVA); 8) Total shareholder return (TSR). This set of eight indicators would ensure complex measurement of medium-sized enterprises' value creation (losses) in their controlling system.

The validity of the set of indicators to measure the enterprise's value and its changes was assessed by surveying the Lithuanian medium-sized enterprises' managers, senior accountants, senior financial officers and other specialists. The survey was carried out by respondents submitting a list of statements that describe the enterprises' approach towards the significance of creating value and the indicators to measure it. The respondents were asked to express their agreement/disagreement with the submitted statements on a 5-point Likert scale, where 1 means that the respondent completely disagrees with the statement; 2 – disagrees; 3 – neither agrees nor disagrees; 4 – agrees; 5 – completely agrees.

The first question was aimed at identifying the enterprises' approach towards the significance of value creation on effective operation of the enterprise. Four statements were given and the respondents had to express their agreement/disagreement. The average level of agreement to the statement *The changes in the enterprise's value in a certain period is an important criterion for effective operation of the enterprise* is 4.53 points; to the statement *Increase of the enterprise's value has to become the main goal in order to ensure the needs of current and future investors* – 4.33 points; to the statement *The enterprises that create value are able to balance between the needs of all stakeholders (shareholders, employees, clients, suppliers, society, etc.)* – 4.37 point; and to the statement *The increase of the enterprise's value ensures its existence in the long run* – 4.51 points. Such a high level of agreement shows that every medium-sized enterprise is interested in increasing its value; therefore the introduction possibilities of the recommended set of indicators to measure the value and its changes are very wide.

The following two questions of the survey were aimed at determining whether the indicators to measure an enterprise's value and its changes recommended by the experts would be acceptable to enterprises that have introduced or are planning to introduce the controlling system.

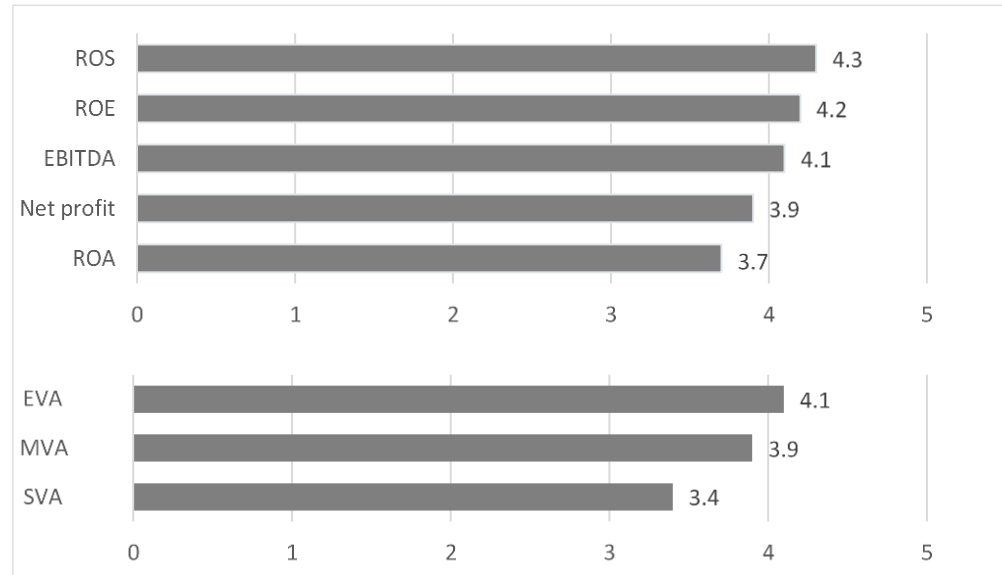


Figure 6. Assessment of suitability of indicators measuring an enterprise's value and its changes

The respondents were asked to express their level of agreement with accounting-based and shareholders-wealth based indicators separately. The respondents were also given a possibility to choose an answer “I am unable to answer” or give an alternative opinion/comment. No respondents have chosen to give an alternative opinion but seven respondents said that they cannot answer any of the questions related to all eight indicators. Figure 6 shows the results of the level of agreement with the recommended enterprise's value and its changes measurement indicators. When estimating the averages, the answers of the seven respondents who had no opinion were eliminated. The medium-sized enterprises survey results show that the enterprises agree that the recommended indicators measure a medium-sized enterprise's value and its changes appropriately and they are willing to introduce them.

Conclusions

The controlling system comprises different, however interconnected, subsystems and their elements whose interaction helps to make optimal decisions. Yet the goal of the system should be considered the most important element of the system, which is expressed through a specific result – an increase in the value of the company. Changes in value in a certain period is the criterion of an enterprise's effectiveness assessing nearly all the information related to its activity. A properly introduced controlling system allows the enterprise to ensure its value growth and successful operation in the long run.

According to both theory and practice, it is proposed to estimate the value of an enterprise and its changes by applying various indicators and methods that fall into two main groups: 1) traditional ones, accounting-based; 2) new ones, shareholders' wealth-based. Different indicators measure an enterprise's value changes differently. Accounting-based indicators are easy to calculate but can only be partially associated to the creation of value, because they do not assess the cash flows, economic life of assets, capital costs, and other factors. Shareholders' wealth-based measurements evaluate the cost of capital, the impact of inflation for the cash flows, and other aspects, but it is difficult to calculate them. Taking this into account, every enterprise should choose proper indicators to measure its value and its changes.

To measure the efficiency of the controlling system oriented towards the increase of a company's value for medium-sized Lithuanian companies, a set of value creation measures was proposed. These indicators have been selected based on the results of the expert evaluation since there are not enough scientific studies identifying the value creation measures of a medium-sized company's activity. Ten accounting-based value creation measures were provided for the expert evaluation and five of them were selected as the most appropriate: Net profit; Earnings before interest, taxes, depreciation and amortization (EBITDA); Return on equity (ROE); Return on sales (ROS); Return on assets (ROA). Out of ten shareholders' wealth-based value creation measures, application of the following measures has been approved: Economic value added (EVA), Market value added (MVA) and Total shareholder return (TSR). Inclusion of these eight measures into the controlling system for medium-sized Lithuanian enterprises would allow to objectively measure and evaluate the size of these enterprises' value and its changes. This combinations of indicators can be successfully applied not only in Lithuania's but in other countries practice as well.

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Dr. Daiva TAMULEVIČIENĖ is Associate Professor of Accounting and Auditing Department, Faculty of Economics and Business Administration, Vilnius University. Scientific interests: controlling, management accounting, modern cost accounting systems, financial management, financial analysis.

ORCID ID: orcid.org/0000-0002-0187-037X

Dr. Armenia ANDRONICEANU is Full Professor of the Administration and Public Management Department, Faculty of Administration and Public Management, Bucharest University of Economic Studies; Senior Researcher of the University of Social Sciences, Lodz, Poland, Researcher of the WSB University, Poland. Scientific interest: management of change; public management; comparative public administration.

ORCID ID: orcid.org/0000-0001-7307-5597

Register for an ORCID ID:

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THE CAUSAL FACTORS INFLUENCING CORPORATE SUSTAINABILITY PERFORMANCE: CASE OF COMMUNITY SMES IN THREE SOUTHERN BORDER PROVINCES, THAILAND*

Dussadee Nakruang ¹, Kwunkamol Donkwa ², Adisak Suvittawat ³

^{1,2,3} Institute of Social Technology, Suranaree University of Technology, Nakhon Ratchasima 30000, Thailand

E-mails: ¹ dussadee.n@yru.ac.th, ² kwnkamol@sut.ac.th, ³ adisak@sut.ac.th

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Abstract. The business sector has started to understand and follow business management that creates a balance between economy, society, and environment for the strength, stability, and sustainability of the business and society as a whole. However, the matter remains a challenge for many organizations, especially for Small and Medium Enterprises (SMEs) businesses. This research aims 1) to analyze the direct influence of entrepreneurial orientation on the corporate sustainability performance of community enterprises in the three southern border provinces and 2) to analyze the indirect influence of entrepreneurial orientation on corporate sustainability performance through the mediator variable which is knowledge integration capability of community enterprises in the three southern border provinces. This research uses an organizational level analysis unit and uses Structural Equation Modeling (SEM) on data collection via questionnaires of 384 community enterprises in three southern border provinces. The sampling was done by multi-stages level and stratified sampling using proportions and specific selection. The results of the research showed that the results of the consistency of the structural equation modeling of the cause and effect factors affecting the corporate sustainability performance of community enterprises of three southern border provinces, consistent with the empirical data at a good level. The entrepreneurial orientation had a direct effect on knowledge integration capability with the highest influence coefficient. In addition, the entrepreneurial orientation had an indirect influence on corporate sustainability performance through knowledge integration capability.

Keywords: corporate sustainability performance; entrepreneurial orientation; knowledge integration capability; small and medium enterprises

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JEL Classifications: D83, L25, L26, M12

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1. Introduction

The implementation results of the sustainability performance are the basis for the success of businesses in the 21st century. If SMEs are striving to solve social and environmental problems by enable businesses to innovate and compete amid rapid changes in the global economy. Thai economy with limited resources, SMEs should have a sustainability perspective as a competitive path. The concept of sustainability performance is the responsibility of the organization that gives importance to the economy, society and environment that deliver the profits of the business and create sustainability for the business (Fred, Forest 2015) by the sustainable development of the organization from 3 Ps: People, Planet and Profit. Businesses are sustainable that will be responsible for the relationship of the Triple Bottom Line (TBL) concept which is consisted of the economic, environmental and social dimensions (Elkington 1997).

Many literature reviews and related research studies support the view that entrepreneurial orientation affects the organization's performance. The concept of entrepreneurship is a measure of the nature of entrepreneurs who have the desire to initiate products, a new brand or a new process for creating competitive opportunities (Covin, Green, Slevin 2006). However, there is a small amount of research that studied the mediator variables of entrepreneurial orientation (EO) and corporate sustainability performance (CSP). From the literature review, there are important variables that affect CSP, namely the concept of knowledge integration capability (KIC). The sustainable advantages related to the ability and resources of each organization to create a competitive advantage by utilizing existing ability and internal and external performance to manage internal and external environment changes. In accordance, the concept of KIC is creating and applying knowledge both inside and outside the organization to produce products and services, an effective ability is important to business organizations. However, innovation involves KIC that leads to a sustainable competitive advantage (Grant 1996). Moreover, it was found that EO had a clear relationship with the EO and activities of EO affecting the organization performance (Kim et al. 2012).

To create competitive advantages, we should strengthen the foundation economy, such as community enterprises which are formed by people in the community, who have gathered people to conduct business with many grassroots levels. This local business is not yet the level of Small and Medium Enterprises (SMEs) or cooperatives. However, community business can help the economy of a certain level to create a welfare system for itself and create immunity for groups or communities. Moreover, it was found that community entrepreneurs still face problems in the strength of businesses, especially marketing, financial, information technology problems, and production cost (Na Sakon Nakhon, Sangkharat 2012). For the review of literature related to the CSP of community enterprises in the three southern border provinces mentioned above. Therefore, we need to study the empirical data to test the influence of factors of EO on indirect effects on CSP of community enterprises through the KIC in the context of the three southern border provinces to create new knowledge on such issues. The three southern border provinces have lowest Gross Provincial Product (GPP) in Thailand such as Narathiwat, Yala and Pattani GPP are 42,737 43,369 and 55,738 million baht respectively (National Statistical Office 2560). Most people did rubber plantation and fishery that caused the creation of Productivity per person of the population and the economic growth is lower than other regions. These areas still need to solve economic problems with continuous support from the government in order to improved economy. This research aims to analyze the direct influence of EO on sustainable results, and to analyze the indirect influence of EO on CSP through the mediator variable which is the KIC of community enterprises in the three southern border provinces.

2. Literature Review

2.1 Corporate Sustainability Performance (CSP)

Based on the study of relevant research, it was found that the principle of CSP is more important today, for both organizational theory and implementation. However, it still lacking clarity of the sustainability of the organization, as how to achieve success. The organizational performance measures are two types such as financial performance measured by economic factors and non-financial performance results (Zehir, Can, Karaboga 2015). The CSP is a two-dimensional combination of environmental performance and social performance indicators (Awan et al. 2017). The responsibilities of social, environmental and economic are major goals of the organization. Especially, environmental-oriented entrepreneurs will have a positive influence on environmental performance and financial performance (Tuğçe, Vayvaya 2016; Jiang et al. 2018; El Idrissi et al. 2020). Companies are interested in domestic trade that they will deal with the production without pollution, and environmental friendliness to the host country. As the increase in organizations in developed countries use TBL in the organization's performance, measured by people, profits and our world. This measure does not focus on profits to measure growing performance (Zhang et al. 2018). As for the green technology dynamics, there is a negative correlation between environmental-oriented entrepreneurs and environmental performance. In addition, the Balanced Scorecard (BSC) is directly related to the management and long-term strategies change to manage the organization's performance. Therefore, the BSC framework balances between financial and non-financial indicators and BSC is a good tool to measure the results of sustainability performance results. Moreover, the concept of Sustainable Balanced Scorecard (SBSC) demonstrates what to measure and what should do to enable the organization to improve sustainability performance (Lesáková, Dubcováb 2016; Nikolaou, Tsalis 2013). The sustainability-focused entrepreneurs are opposed to the economic aspect in that they share a place taking into account social benefits and self-interest. In addition, it was found that the founders of a sustainable business organization will have a decision-making process or an organization's policy that combines the value of sustainability in a formal and informal form. In the first competition, environmental-oriented entrepreneurs will have a positive influence on the results of environmental operations and financial performance. As for the green technology dynamics, there is a negative relationship with entrepreneurs who focus on the environment and environmental performance (Salzmann et al. 2005; DiVito, Bohnsack 2017).

2.2 Knowledge Integration Capability (KIC)

The important knowledge of the organization and information technology can adjust the knowledge model to implement employees that help to share and integrate their knowledge effectiveness (Basagliaa, Caporarello, Magni, Pennarolab 2010). All knowledge management process is very important to organizational performance (Shiaw-Tong et al. 2016). Knowledge can be completed with the KIC that the service business focuses on projects in its operation not only simplifies knowledge management process in services innovation process, but there is also evidence to support the competitive advantage of service innovation that can be sustainable. In addition, new knowledge acquired from inside and outside the organization that may not be enough effectiveness, therefore we should integrate existing knowledge in order to create a solution for innovative services that meet the customers' need (Salunke et al. 2018).

The organization climate is important to the ability to integrate information technology, and it affects team work as well. The process that results in successful performance is due to creation, conversion and exchanging of knowledge, which have a positive influence on organization performance (Tanriverdi 2005). Therefore, the knowledge needs, skills, and abilities of employees are essential, especially technology and new processes that will be apply in the market (Ivanov, Avasilcăi 2014). Moreover, EO can drive the maximum entrepreneur's efficiency performance. As for the transfer of knowledge and integration of various types of knowledge, there is a

positive correlation between environmental performance and financial performance (Montoya et al. 2017; Jiang et al. 2018).

2.3 Entrepreneurial Orientation (EO)

All autonomy, risk taking, proactiveness and competitive aggressiveness variables have statistical significance (Zehir et al. 2015). Risk taking has a positive influence on entrepreneurial orientation but risk taking is not related to EO of small entrepreneurs (Josien 2012). Proactive actions will affect the rapid development of innovation (Shan et al. 2016). EO and firm performance in country have significant statistical variance (Semrau et al. 2016). Additional, new entrepreneurs have characteristics of EO that can manage business better than another (Shan et al. 2016; Hult et al. 2003). The fluctuating environment may have positive and negative effects on organization performance encouraging the organization to have better performance (Pratono, Mahmood 2015). The organizational or corporate innovative capabilities have a positive relationship with the performance results of the organization (Atalaya et al. 2013).

The EO, as an indication of the firm's processes, structures and behavior to take opportunities, can help us greater depth understanding how sustainable entrepreneurs manage this paradox of entrepreneurial enterprising within limits of economic, ecological and social responsibility. So, the different configurations of EO in accordance with the sustainability decision profiles and we extend the literature by showing how the reflexivity of EO interacts with sustainability orientation (DiVito, Bohnsack 2017). In addition, EO activated by grassroots innovation significantly influence entrepreneurial success in the Indian context (Singh et al. 2019). Moreover, when we use separate or combine the influence of strategic drivers (entrepreneurial orientation, market orientation and knowledge management orientation) over cleaner production, there is a higher chance of cleaner production success, with a significant increase in sustainable competitive advantage for the small and medium enterprises (Guimarães et al. 2018).

Therefore, to make the research results consistent with the objectives set, the following important research hypotheses have been formulated.

H₁: Entrepreneurial orientation has a positive direct influence on the corporate sustainability performance of community enterprises.

H₂: Entrepreneurial orientation has a positive direct influence on the knowledge integration capability.

H₃: Entrepreneurial orientation has indirect influence on the corporate sustainability performance of community enterprises through the knowledge integration capability.

3. Conceptual Framework

This research based on the concept of CSP, EO and KIC. EO is potentially important to entrepreneurship consists of innovativeness, risk taking, competitive aggressive, proactive and autonomy (Li et al. 2009; Muchiri 2013) that describes a fairly consistent set of related activities and process. KIC is a concept based on learning culture, knowledge management process capability and information technology capability which enable the organization generate knowledge regarding its competition and economic environment changes (Garvin 1993; Grant 1996; Kim, Sanders 2002; Ryu et al. 2005; Kim et al. 2012). CSP can identify manage and measure the drivers of improve sustainability in systems and structure that consists of social performance, environmental performance and economic performance such as financial, learning and growth, internal and customer perspectives (Prajogo 2007; Josien 2012; Kaplan, Norton, 1996, 1997, Sebhatu 2008; Cantele, Zardini 2018). From the relevant

literature, explained that EO and KIC effect to competitive advantage in the long run (Gold et al. 2001, Kim et al. 2012; Jiang et al. 2018). Therefore, the conceptual framework of this research as figure 1:

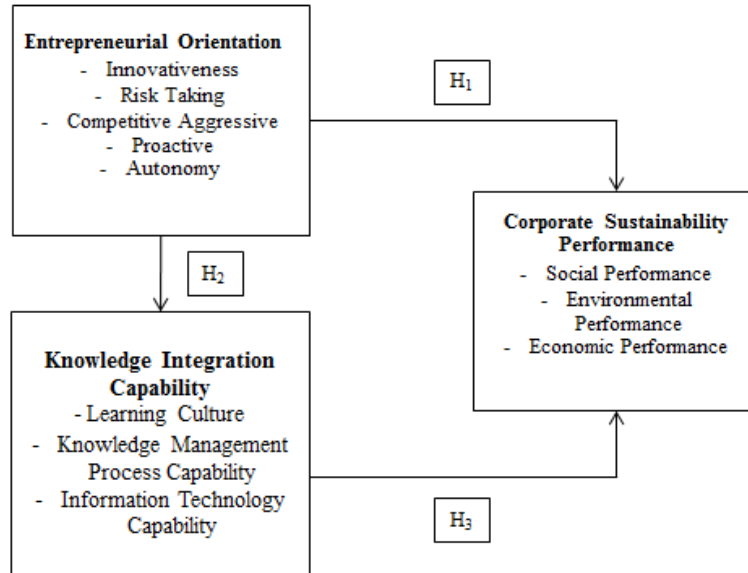


Figure 1. Conceptual framework

4. Research Methods

This research is a quantitative analysis of a survey research which has a method to collect data using questionnaires as a tool.

The population are 1,036 groups of community enterprises in the three southern border provinces, namely, Yala, Pattani and Narathiwat, (Agricultural Offices in Yala, Pattani and Narathiwat 2016) with particular emphasis on group leaders / group committees or those involved in the management of community enterprises in the three southern border provinces that have a good level of strength with a minimum of 3 years of continuous operations. The large sample group will give more accurate statistical calculations than small samples (Wiersma, Jurs 2009). The sample size should be at least 300 samples (Norusis 2010). Therefore, this study has determined the size of the sample group used in the study of at least 384 community enterprises by collecting 1 sample questionnaire per 1 community enterprise group by which 2-3 committee members or members of the community enterprise group responded using a multi-stage sampling method, i.e. non-probability sampling by using purposive sampling, probability sampling by using stratified random sampling and quota sampling, based on the population that is proportional to the number of community enterprise groups in the three southern border provinces.

The questionnaire included three constructs dedicated to CSP, five constructs dedicated to EO and three constructs dedicated to KIC measuring the possible mediator in CSP and EO relationship. The questionnaire provides the target sample group is self-report. The whole set of questionnaires has α Coefficient of 0.983. Compared to the criteria (Kline 2011), it is considered “Very good” and the Index of Item Objective Congruence: IOC is in the range of 0.67 to 1.00 higher than 0.50 (Rovinelli & Hambleton 1977).

We used Confirmatory Factor Analysis (CFA) and analyzed to test hypotheses. The SEM analysis for structural relationship analysis of causal factors affecting the CSP of community enterprises in three southern border

provinces was conducted by examining the consistency of the structured model defined with empirical data, and by studying the direct/indirect influence and the total influence of EO on the CSP of community enterprises in the three southern border provinces. The analysis was done using computer software.

5. Results

Before analyzing SEM, we have checked the completed questionnaires that received from the respondents. The results of skewness is between -0.326 and -0.054 and kurtosis is between -0.082 and 0.104 that the criteria of skewness is not more than 3 and kurtosis is not more than 10 (Kline 2011). The results show that data has a normal distribution. Therefore, it is appropriate to analyses SEM. The overall results of the measurement model, factor loading (raw score) show that all observed variables relate with latent variables for a significance level of .01 (Hair et al. 2010). Standardized factor loading in all variables are between 0.73 and 0.89. From the criteria of Hair et al. (2010) explained that factor loadings should equal or more than 0.5 that mean all observed variables of each latent variables have high covariance.

The accuracy of latent variable is good level that Construct Reliability (CR) should equal or more than 0.7 (Hair et al., 2010). This measurement model showed that latent variable is between 0.82 and 0.91. This result explains that all latent variables in this measurement model have high reliability. Average Variance Extracted (AVE) of latent variables is between 0.60 and 0.79 that are more than 0.5 as acceptance criteria (Hair et al. 2010). The results are no error in the measurement that causes variations in the observed variable more than the directed latent variable. Regression coefficients (R^2) explain about the validity of each observed variables. High Regression coefficients mean high validity. This results show that R^2 is between 0.50 and 0.80 that almost observed variables are high stability to explain covariance of each latent variable.

The finding revealed that the majority of respondents are Pattani community enterprises (63.3%) follow by Narathiwat community enterprises (19.3%) and Yala community enterprises (17.4%). The majority of them managed processed and produced food (53.1%) follow by agricultural products (15.1%). They almost used resource inside and outside their local area (56.0%). The levels of performance or opinions are following as table 1.

Table 1 Arithmetic mean and standard deviation of level of variables

Variables	Mean (\bar{x})	Standard Deviation (S.D.)
Entrepreneurial Orientation	3.81	0.52
Innovativeness	3.81	0.55
Risk Taking	3.82	0.60
Competitive Aggressiveness	3.77	0.62
Proactiveness	3.74	0.65
Autonomy	3.91	0.59
Knowledge Integration Capability	3.74	0.59
Learning Culture	3.92	0.61
Knowledge Management Process Capability	3.79	0.63
Information Technology Capability	3.52	0.73
Corporate Sustainability Performance	3.82	0.56
Social Performance	3.93	0.64
Environmental Performance	3.73	0.65
Economic Performance	3.79	0.65

The highest of performance or opinions are CSP (\bar{x} =3.82), EO (\bar{x} =3.81) and KIC (\bar{x} =3.74) respectively. The result of observed variable of CSP found that social performance has highest opinion (\bar{x} =3.93). The highest performance of observed variable of EO is risk taking (\bar{x} =3.82) and learning culture as observed variable of KIC has the highest opinion (\bar{x} =3.92).

The results are mentioned by objectives as follows:

1. It was found that Chi-square Statistic: χ^2 is equal to 111.655, df to 41, p-value to .000. That means the statistic of the Chi-square is statistically significant, which is usually considered not to meet the specified criteria. But from the feedback given by Hair et al. (2010), in the case of more than 250 samples and 13-29 observed variables, the chi-square statistic is expected to be insignificant. For this study, data was collected from 384 community enterprises in the three southern border provinces and 14 observed variables. Therefore, when comparing those suggestions, it was considered that Chi-square statistic has passed the criteria. However, the Chi-Square statistic has limitations in that it depends on the sample size. Therefore, other statistical values should be considered, such as the normed chi-square (χ^2/df), which is the ratio between the chi-square (χ^2) and the degree of freedom (df) of less than 3.00 (Hair et al. 2010). The results showed that there was a normed chi-square (χ^2/df) equal to 2.723 indicating that it met the criteria. For the root mean square error of approximation (RMSEA), it is found that the value is 0.067 which is less than the specified criteria. The results of the examination, therefore, indicate that the criteria are consistent with the evaluation by the standardized root mean residual (SRMR). It is also found that the value is 0.01. The results further indicate that the criteria as well as the comparative fit index (CFI) have a value of 0.978. The results indicate that it also met the criteria. Therefore, it could be concluded that the model for measuring the results of the established sustainability performance variables is consistent with empirical data as figure 1 and table 2 .
2. From figure 2 and table 3 showed the coefficient of direct effect, indirect effect and the total effect of the structural equation model (Standard Score). It was found that the variables influence on CSP is KIC. EO had not direct effect on CSP at statistical significance with a coefficient of influence equal to 0.20 which is a denial of Hypothesis 1. However, it was found that EO variables had a direct effect on KIC with statistical significance at the level of .01 . The highest influence coefficient was 0.91 , which followed Hypothesis 2 . When considering indirect influential of EO variable towards CSP through KIC with statistical significance at the level of .01 , the influence coefficient is equal to 0.72, which followed Hypothesis 3.
3. The results showed that EO and KIC could explain the variance of CSP (94.0%) and EO had indirect effect on CSP through KIC. Community enterprises will do their business to have sustainable performance that should raise the process of KIC such as knowledge creating, sharing, transferring and application for members in order to improve sustainable performance. SEM is presented in Figure 2 below.

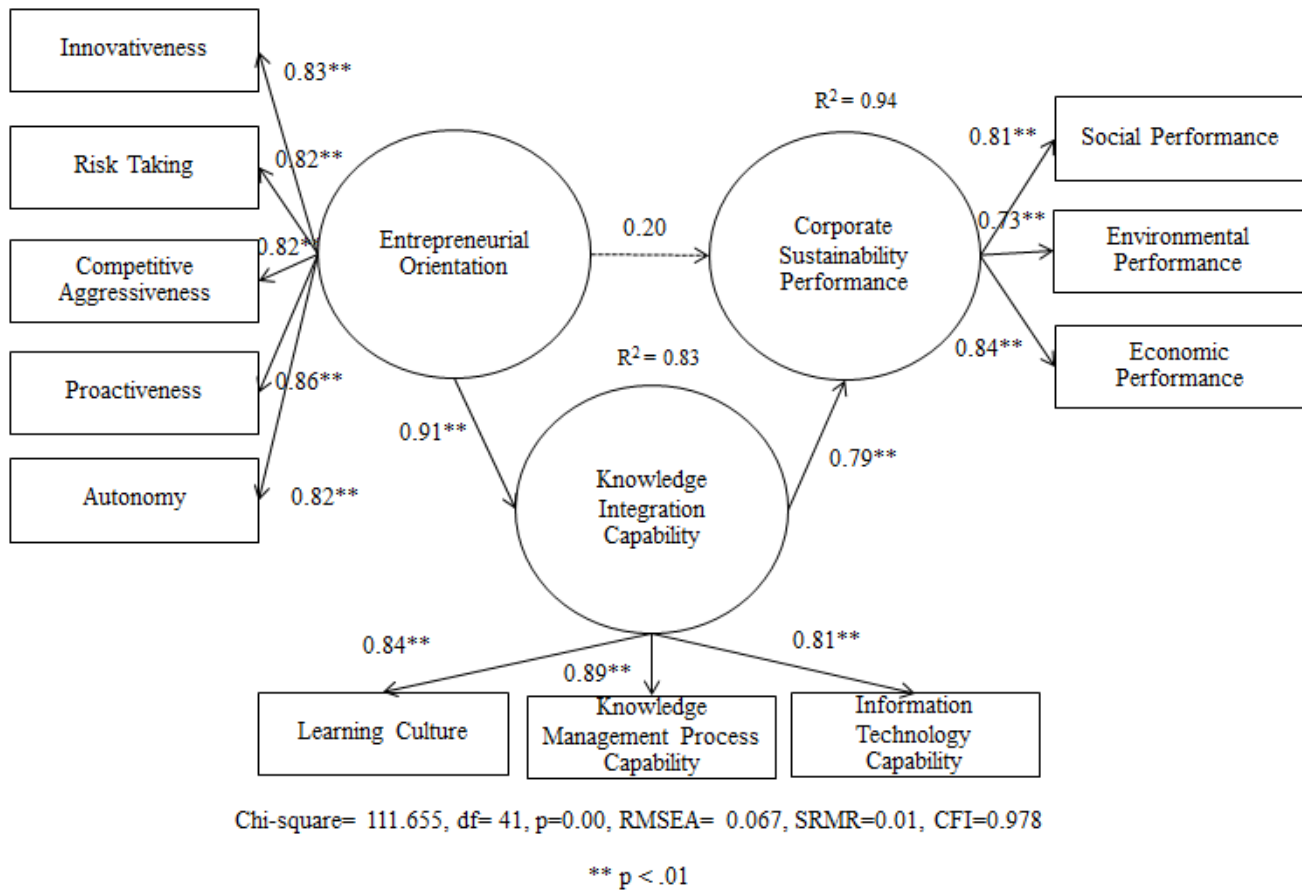


Figure 2. Structural Equation Modeling (Standardized Estimates)

Table 2. Assessment of the consistency of structural equation modeling with empirical data

Consistency Index	Criteria	P-Values	Analysis
1. χ^2 or χ^2/df	p < .05 (Significant) Less than 5.00	0.00 2.723	No-Passed Passed
2. RMSEA	Less than 0.05-0.08	0.067	Passed
3. SRMR	Less than or Equal to 0.80)together with CFI more than 0.92(0.01	Passed
4. CFI	More than 0.92	0.978	Passed

Table 3 Coefficient of direct effect (DE) and indirect effect (IE) and total effect (TE) of the structural equation model (Standard Score)

Variables	DE	IE	TE
EO → CSP	0.20 ^{ns}	-	0.20 ^{ns}
EO → KIC	0.91**	-	0.91**
EO → KIC → CSP	-	0.72**	0.72**

**p<.01, ns= not significant

5. Discussion

From the results, EO had not direct effect on CSP with statistical significance. Community enterprises were driven by key person only group leader is not enough to reach their goal because this business relies on the cooperation between the leaders and group members. The group leader has knowledge and ability in managing groups, discipline, ability to set clear objectives or plans, promote products to meet standards, and aggressive marketing that can set and raise their firm performance. While community enterprises encourage the development of group members by promoting knowledge management capabilities with create, share, transfer and apply their knowledge to raise competitive advantage) Salunke et al. 2018). Community enterprises have outstanding performance that can be mentors to raise potential capability with other community enterprises in order to transfer knowledge to professional development skills (Shiaw-Tong et al. 2016). Group leader should set policy to give opportunity for members to access more education for improve performance in the long term (Jiang et al. 2018). However, it was found that EO variables had a direct effect on the KIC. The group leader should develop EO trait of member and gives importance to develop their knowledge. Moreover, community enterprises cooperate with the educational institution to develop their knowledge from the basic to the application in order to expand knowledge as creative thinking and continue learning.

Summary

The highest of performance or opinions are CSP (\bar{x} =3.82), EO (\bar{x} =3.81) and KIC (\bar{x} =3.74) respectively. The SEM was consistent with the empirical data) χ^2 = 111.655, df = 41, χ^2 /df = 2.723, RMSEA= 0.067, SRMR= 0.01, CFI= 0.978. The results of direct and indirect influence of EO affecting the CSP of community enterprises in the three southern border provinces show that the EO has a direct influence on the KIC and has a indirectly influencing CSP by passing on the KIC (mediator) in line with the hypotheses set, while EO has not direct influence on CSP. The contributions of this research are: 1) creates the conceptual framework of CSP which received the effect from EO and indirect effect through KIC; 2) confirms the importance of EO and KIC for CSP under three southern border provinces.

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Dussadee NAKRUANG is an Assistant Professor at Faculty of Management Sciences, Yala Rajabhat University. She is currently a Ph.D. Candidate in Management at Suranaree University of Technology, Thailand. Her thesis is focused on corporate sustainability performance, entrepreneurship and knowledge management.

ORCID ID: orcid.org/0000-0002-1812-6299

Kwunkamol DONKWA is an Associate Professor at the School of Management Technology, Institute of Social Technology, Suranaree University of Technology. She holds the Ph.d. (Agricultural Economics) degree from Kasetsart University, Thailand. Her current research interests include economics, community's economy and entrepreneurship.

ORCID ID: orcid.org/0000-0003-3429-3924

Adisak SUVITTAWAT is an Assistant Professor at the School of Management Technology, Institute of Social Technology, Suranaree University of Technology. He holds the DBA degree from Asian Institute of Technology, Thailand. His current research interests include supply chain management, service quality, logistics and entrepreneurship.

ORCID ID: orcid.org/0000-0001-5225-5804

Register for an ORCID ID:

<https://orcid.org/register>

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INITIAL COIN OFFERINGS (ICOs): BENEFITS, RISKS AND SUCCESS MEASURES*

Alfreda Šapkauskienė¹, Ingrida Višinskaitė²

^{1,2} Kaunas University of Technology, School of Economics and Business, K. Donelaičio g. 20, Kaunas, Lithuania

¹ Vilnius University, Faculty of Economics and Business Administration, Sauletekio al. 9, Vilnius, Lithuania

E-mails:¹ alfreda.sapkauskiene@evaf.vu.lt; ² ingrida.visinskaite@ktu.edu

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Abstract. The initial coin offering is usually defined as a new, innovative way of raising funds used by organizations, companies, or entrepreneurs, attracting funds through a cryptographic exchange in exchange for the coins that can be sold, used for future products or services purchase or profit. This article provides an overview of the evolving ICO market and indicates the main advantages and risks of the ICO. It is pointed out that ICO offers many advantages, such as high liquidity, return on investment, availability, fast capital raising process, minimization of capital raising costs. Nonetheless, the noticeable benefits of ICOs are often available only when companies or investors agree to take considerable risks, caused by the information asymmetry, lack of investor protection, proper regulation and methodical guidance both for investors and entrepreneurs. Considering the novelty, volatility, emerging risks, growing popularity of the ICO market and the lack of research in the scientific literature, it is important to investigate the factors that influence the success of the ICO, which is usually defined as the amount of funds attracted, listing of the coins, return on investment, market capitalization or the duration of the ICO.

Keywords: Initial Coin Offering; ICO; Token; Blockchain; Cryptocurrencies; Diversification; FinTech; Open Innovation

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1. Introduction

The initial coin offering (ICO) is usually defined in the literature as a new, innovative way of raising funds used by organizations, companies, or entrepreneurs, attracting funds through a cryptographic exchange in exchange for the tokens that can be sold, used for future products or services purchase or profit. Constantly evolving technologies, the growing use of cryptocurrencies and the changing needs of market participants have led to the emergence of this innovative investment and financing instrument which is rapidly gaining ground in an extremely short period of time. Despite the fact that the various advantages of the ICO causes its attractiveness, increasing popularity and relevance in the modern market, investors or companies are also exposed to a number of

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risks. Obviously, the market of the ICO is extremely new, constantly changing and has the potential to further expand in the future, but it has so far been poorly explored, challenging both investors and businesses to choose the most appropriate and successful investment or financing strategy. Considering this, various scientists have started to analyze the concept, regulation of the ICO (Kaal, 2018; Barsan, 2017), comparison with other financing methods (Ofir and Sadeh, 2018; Hu, Parlour, and Rajan, 2018) various success factors (Ante et al., 2018; Momtaz, 2018; Lee, Li, and Shin, 2018; Burns and Moro, 2018). Scientists often point out that this area is still rather vague, poorly researched, risky, lacking in generalizing and unanimous conclusions, methodological guidelines for investors and companies seeking to successfully use ICO for investment or funding, taking into account the determinants that have the greatest impact on their success.

Purpose of the article. Following the analysis of the scientific literature, make recommendations to investors and companies on the factors that influence the success of the initial coin offerings the most in order to successfully invest or use it for financing.

Methodology / methods. Analysis of scientific literature, comparison, aggregation, grouping, collection of statistical data, analysis, systematization.

Findings. Before ICO emerged, companies used traditional financing methods such as bank loans, shares, venture capital, crowdfunding and others to attract funding. It is clear that the growing popularity of the ICO is due to a number of its advantages, such as the high level of investment return offered, high liquidity, fast financing, cost minimization and high availability, which are increasingly encouraging innovative investors and businesses to forget traditional financing methods. Nevertheless, the ICO market is young, indefinite, constantly growing and changing, faced with significant risks of poor regulation and investor protection, information asymmetry, potential fraud and lack of methodological guidance. Given the strengths and risks of ICO, the popularity of its application is determined by success factors such as the amount of funding attracted, listing, return on investment, market capitalization and duration of the ICO.

Conclusions. There are a lot of strengths and weaknesses of the ICO mentioned in the scientific literature. Although ICO offers high liquidity, return on investment, availability, fast capital raising process, minimization of capital raising costs, those benefits are often available only when companies or investors agree to take considerable risks, caused by the information asymmetry, lack of investor protection, proper regulation and methodical guidance both for investors and entrepreneurs. The analysis of the ICO success indicators suggests that the most commonly used indicator for the success of companies or entrepreneurs is the amount of funding attracted by the ICO. In terms of indicators defining the success of investors, ICO's return on investment is most often used. Also, widely used ICO success measures are the listing of coins on a variety of virtual platforms, market capitalization of the coins and the duration of the ICO.

2. Reasons for the growing popularity of ICO

The Initial Coin Offering (ICO), which was first held in 2013, as Amsden and Schweizer (2018) claim, due to the potential of rapidly evolving technologies and the growing popularity of crypto currencies, has created new business models and, at the same time, the need to raise capital and accelerate business growth. According to Boreiko and Vidusso (2018), rapid technological change, the beginning of financial technologies, excessive regulation of the financial sector and the inability to adapt to the ever-changing needs of small debtors have led to the emergence of previously unheard alternative financing methods. According to Huang, Meoli, and Vismara (2019), along with the continuing increase in popularity of crypto currencies, a new opportunity has emerged for businesses to use them as a way to raise funds and finance new projects through ICO. As pointed out by Amsden and Schweizer (2018), a mechanism was proposed to raise funds without using traditional financing methods such as venture capital, crowdfunding or initial public offering of shares, but using blockchain technology instead to

sell virtual tokens. Given the novelty of this concept and the fact that the biggest breakthrough of ICO occurred in 2017, when the ICO number increased significantly and, according to Boreiko and Sahdev (2018), the amount of capital attracted through the ICO outperformed traditional venture capital funds, most of the scientific literature on this topic is found from 2017-2018. Most often the scientific literature analyzes the concept of ICO while comparing it with other ways of funding, ICO regulation, success factors, which in general highlight the main advantages of ICO, increasing their attractiveness and popularity, as well as risks that cause market volatility and harder decision making.

Until the emergence of ICO, in order to attract financing companies used traditional financing methods, such as bank loans, stocks, venture capital, crowdfunding, etc. Obviously, the ICO has a lot of similarities to other ways of raising capital. As Barsan (2017) points out, ICOs are similar to Initial Public Offering (IPO), where companies sell part of their capital on the stock market and crowdfunding, when funding is drawn from a heterogeneous group of investors on virtual platforms. With the growing popularity of ICO, as Amsden and Schweizer (2018) point out, entrepreneurs quickly realized that the ICO could be structured to resemble other forms of financing that are already developed, such as shares, bonds, crowdfunding, venture capital, private equity funds, hedge funds, etc. According to Ofir and Sadeh (2018), the rapidly growing popularity of ICO was accelerated by their use as a protection against volatile local currencies and geopolitical risks, distrust of the traditional banking sector after 2008 global financial crisis and increased media attention. The ever-growing popularity of ICO shows that ICO offers a number of advantages to both investors and businesses or entrepreneurs that motivates them to choose exactly this type of financing or investment (see Figure 1).

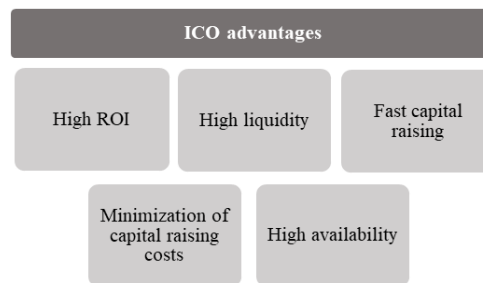


Fig. 1. The advantages of ICO that are usually analysed in scientific literature.

In particular, in the case of investors, Fisch, Masiak, Vismara and Block (2018) study of the motives to invest in ICO has shown that some of the most important for the investors are ideological, technological and investment motives. Although the authors emphasized the importance of ideological motives, which illustrates the uniqueness of ICOs in the context of funding for entrepreneurship, because such motives are not usually characteristic of more traditional forms of financing. Nonetheless, investor decisions are also heavily influenced by financial motives, one of which is the extremely high return on investors offered by ICO. After their study, Benedetti and Kostovetsky (2018) noticed a significant underpricing of the ICO and an average of 179 percent seeking first day return. The authors also found that after the start of trading, the price of coins continues to rise, generating an average of 48 percent return on the first 30 trading days. Such high returns Benedetti and Kostovetsky (2018) explain as a compensation to investors for investing in high-risk, often unverified and non-revenue generating platforms through unregulated trading, lack of competency in determining the market demand of the coins, a higher uncertainty of the value of the start-up platform that is often only in the idea stage and the hurry to sell the coins faster so that the platform, once funded, could operate. This shows that for investors driven by financial motives, ICO can be an attractive investment alternative as it can offer an extremely high return on investment if successful.

High liquidity also increases the popularity and attractiveness of ICOs for investors. Adhami, Giudici, and Martinazzi (2018) argue that the coin mechanism allows investors to create a secondary market for their investments, thus increasing their liquidity. Benedetti and Kostovetsky (2018) point out that shortly after ICOs, coins are listed on one or more virtual platforms, providing liquidity to investors and enabling the sale of purchased coins in the secondary market. Comparing ICOs with other investment alternatives, Kaal (2018) states that ICO provides investors with the greatest liquidity faster than any other form of capital formation. ICO's liquidity is also highlighted by Hu, Parlor and Rajan (2018), arguing that coins can sometimes be sold on the secondary market even before the ICO is finished, while risk capital investments are less liquid and often can be retained for several years before their potential sale. According to Momtaz (2018), most coins are listed on a virtual platform within three months after the end of the ICO, and emphasizes that neither crowdfunding nor risk capitalists can provide a similar level of liquidity. All this shows that for investors seeking high liquidity and the ability to quickly recover the invested money and additional return, the ICO is a fairly attractive investment solution, often providing much higher liquidity than any other investment alternative.

In terms of start-ups or other companies seeking to attract funding through ICOs, their attractiveness is enhanced by the potential for fast funding. According to Kaal (2018), ICO allows for fast funding, avoiding the often long, complicated financing process when choosing traditional financing methods. The speed of ICO funding is highlighted by De Jong, Roosenboom and Van der Kolk (2018), pointing out that some blockchain start-ups were able to raise capital through the ICO at record speed and gives an example of the company called Gnosis, which got 12 million dollars of financing in less than 10 minutes. Barsan (2017) refers to Bancor Protocol, which attracted more than 150 million dollars within 3 hours in 2017. De Jong et al. (2018) points out that some start-ups in the blockchain were able to raise funds at record speeds, mainly due to investors' fear of missing out. According to Amsden and Schweizer (2018), ICO characteristics such as their virtuality, globalization and poor regulation help attract more investors, which also contributes to the speed of funding.

Another important factor in increasing the attractiveness of ICOs as a financing method is the minimization of funding costs, which happens largely due to the fact that ICOs usually do not require any financial intermediaries. As one of the most important advantages of ICO, Kaal (2018) identifies their cost efficiency, which compensates for market complexity and unpredictability. According to Boreiko and Sahdev (2018), the smooth functioning of modern economy is not imaginable without financial intermediaries, such as banks or other companies providing financial services, which reduce the asymmetry of information, but on the other hand can also often operate more on their own interests. Choosing another method of financing, for example IPO, it is usually not possible to avoid the cost of financial intermediaries, but according to Boreiko and Sahdev (2018), companies seeking to raise capital through the innovative blockchain based technologies do not need high marketing and advertising or intermediary costs which helps to reduce the cost of raising capital and thus increase the attractiveness of this method of financing.

In literature, one of the most important advantages of ICO for both investors and businesses is also often mentioned the greater availability compared to other forms of financing or investment, which is largely due to the still rather poor regulation. Comparing ICOs with other financing or investment alternatives, Rhue (2018) states that there is a wide range of legal and financial requirements to raise funds using the IPO, while the ICO process is relatively easier. As for the availability of ICO, An, Duan, Hou, and Xu (2019) point out that due to their virtuality, low level of regulation, ICO allows investing and using ICOs to finance or invest for a wider range of investors and companies for which traditional investment or financing methods could not be available. Although ICO provides opportunities to attract funding for companies or invest for investors that do not meet often fairly high requirements when choosing other alternatives, Fisch (2018) point out that due to their high-tech nature, ICOs are generally only available to companies using blockchain technologies. However, as the use of the blockchain becomes more and more popular, ICO is becoming more accessible and used by a wider range of companies.

The availability and popularity of ICOs is also increased by the globalization of financing. According to Boreiko and Sahdev (2018), ICO virtualization makes it possible for anyone, anywhere in the world, to invest in a company that is also established or operating in any country. Companies can leverage social networks and other virtual communication channels to attract funds from abroad that are not limited by local financial system. According to Boreiko and Sahdev (2018), traditional sources of funding, such as bonds, stocks, venture capital funds or bank loans are localized in a specific geographical area and defined in its legislation. Such a global nature of ICO allows to attract more international investors and expand their investment opportunities. As Chen (2018) point out, that is how ICO is changing fundraising, by democratizing the access to financial capital and allowing to finance projects much faster, easier and more efficiently.

It is clear that the rapidly growing popularity of ICOs has a number of reasons that increase their attractiveness for both investors and companies seeking financing. This explains the ever-increasing number of ICOs and the likely future growth. Nonetheless, the noticeable benefits of ICOs are often available only when companies or investors agree to take some considerable risks.

3. ICO limitations and risks

In literature ICO is often mentioned as new, volatile, high-interest, but still poorly researched innovative financing method. As Amsden and Schweizer (2018) claim, ICO, as a method of raising capital for blockchain based companies, is a new phenomenon and little is known about the decision-making process of ICO investors. They are also supported by De Jong et al. (2018) pointing out that despite the growing popularity of the ICO, the number of successful ICOs began to decline, and regulators drew attention to the risks of largely unregulated ICOs, that are often mentioned in the literature (see Figure 2).

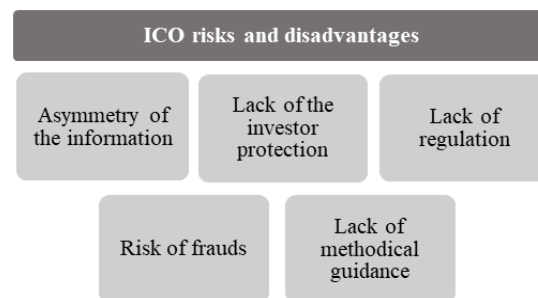


Fig. 2. The most often analysed risks and disadvantages of ICO in the scientific literature.

One of the most important factors that increases the market risk of ICOs and makes decision-making more difficult is the asymmetry of information and the amount of information disclosed that is often too low. First of all, one of the already mentioned advantages of the ICO, which is non-use of intermediary services may make it difficult to obtain proper information about the ICO. According to Li and Shin (2018), in order to overcome the asymmetry of information while using IPO, financial intermediaries are conducting an inspection and assessing the value and the risk of the business, the price of the shares being sold, while intermediary services are not used through the ICO.

Considering the immediate nature of ICO transactions and the resulting problems, Boreiko and Sahdev (2018) said that a significant number of virtual platforms have started providing ICO listing, analysis and rating services for investors to meet their information needs, which are usually met by financial intermediaries while using traditional financing methods. At first glance, it would appear that the information provided on such platforms

would allow the fastest and most reliable assessment of the ICO's prospects. De Jong et al. (2018) research of the ICO expert ratings presented in various ICO platforms showed that expert ratings are a valuable tool to overcome the information asymmetry associated with ICO. On the other hand, a research of ICO ratings from various sources of information conducted by Rhue (2018) showed that it is quite difficult for investors to get reliable guidance on ICOs. Boreik and Sahdev (2018) research of the ICO ratings and listing platforms showed, that the information on various ICO platforms do not always correlate, sometimes they use different data for rating which is often undermining their credibility. Because of that it is difficult for investors to get objective information about the ICOs of interest and make the right investment decisions. The assessment of information, market tracking and analysis is also hampered by the fact that, as Fisch (2018) claims, there is no single ICO platform or database, nor is ICO registration required.

The lack of ICO regulation and the lack of appropriate disclosure requirements also contribute to information asymmetry. Amsden and Schweizer (2018) say that there is no uniform format for white paper, often comparable to the IPO-provided prospectus, rules regarding the information contained therein, which also increases the asymmetry of information, complicates the comparison of different ICOs and decision making. Companies, considering that disclosure of ICO information is not regulated, often provide not enough information for investors. Kaal (2018) argues that the lack of mandatory disclosure requirements results in irregular and inadequate disclosure of information and reduces the transparency of the ICO market. According to Blaseg (2018), the regulations of the information disclosure would not be necessary if companies voluntarily disclosed relevant information enabling informed decisions to be made and its value would be recognized by investors. Amsden and Schweizer (2018) also point out that, in the case of ICO, the amount and methods of disclosures depend on the ICO implementing company, so investors need to assess the information they receive independently, which, according to Amsden and Schweizer (2018), can often become quite complicated with regard to the fact that a large part of ICO's investors are small, often without sufficient financial and investment knowledge.

The lack of investor protection is also often mentioned as one of the most important ICO risks. As already mentioned above, ICO provides a great return for investors, but this is only possible with a significant risk associated with the ICO. According to Chen (2018), ICOs are usually implemented at the earliest stages of project life, when their future prospects are not yet clear and predictable, so investors may lose all their invested money in the event of a project failure. Kaal (2018) points out that ICO investors, unlike shareholders, do not have any control over the company they invested in and usually invest in the idea of a future product or service and one of the few ways to protect their investments is to sell the coins after the ICO ends.

According to Ante, Sandner, Fiedler, Tumasjan and Welp (2018), the ICO market is still characterized as having very high returns for investors, but lacking proper regulation. The lack of regulation has already been mentioned as one of the advantages of the ICO, increasing their availability, but it also poses considerable risks and uncertainties in the ICO market. The lack of clear regulation and the associated risks have brought regulators' attention to ICO worldwide. According to Boreiko and Sahdev (2018), ICO has the potential to quickly and unpredictably change the traditional financial and banking industry, which has led many national regulators to consider it suspicious and fearsome. A study conducted by Kaal (2018) on ICO regulation in various countries showed that in 25 leading countries by ICO market capitalization a favourable attitude prevails over ICOs and most countries such as Switzerland, Singapore or Japan allow ICOs and crypto currencies and use existing laws to regulate it or just wait how other countries will react to this crypto evolution. However, according to Kaal (2018), there are countries that banns ICOs and crypto currencies, such as China and South Korea, while others only warn of the risks associated with ICOs, setting limits that cannot be overstated and advise not to invest in ICO (for example USA). Huang et al. (2019) found that most ICOs are implemented in countries that regulate ICOs and have established favorable ICO regulation, have more developed financial markets, digital technologies and availability of investment-based crowdfunding platforms.

Obviously, as Barsan (2017) argues, the positions of regulators from different parts of the world in terms of ICO are different and it is not clear if decisions taken in one jurisdiction could be successfully adapted and transferred to another one. Such volatility can also cause some difficulties in applying the ICO. According to Wisniewska (2018), one of the most challenging parts of the ICO application is legal barriers, because the ICO market is virtual and global, and depending on the country, ICOs can be banned, partially or completely regulated.

Despite the ever-growing need for regulation, Barsan (2017) points out that over-regulation could possibly reduce the popularity of ICOs, making it difficult to implement an ICO that meets potentially conflicting rules. He is supported by Fisch et al. (2018) pointing out that overly cohesive ICO regulation can reduce their innovative potential and regulators should pay attention to the different motives to invest in ICOs and try to reduce the investment risk of ICOs without compromising their technological side.

The uncertainty of the ICO market is underlined by Albrecht, Lutz and Naumann (2019) that points out that legislators are concerned about the possibility of the financial fraud while using ICO. Wisniewska (2018) points out that ICOs should be treated cautiously due to the high risk of fraud. Those authors are also supported by Boreiko and Sahdev (2018) stating that one of the biggest problems of ICO is the risk of fraud, as the whole process is carried out virtually and mostly anonymously, enabling both investors and project teams not to reveal their identity, which makes it particularly difficult to track down where the misappropriated funds went in case of the fraud. ICO can be used for frauds in a variety of ways. Barsan (2017) refers to cyber security, cyber attacks and possible fraud such as the use of the Ponzi scheme. Benedetti and Kostovetsky (2018) claim that the anonymity of crypto currencies accounts, irrevocability of transactions, and poor regulation of ICOs create conditions for fraud and theft, for example hacking into a legitimate ICO website or social networking account and replacing instructions so that investors send money to the scammers instead of the legitimate coin sellers. According to the authors, the ICO organizers themselves may be scammers using various fraud schemes, ultimately neglecting a project that has received funds and keeping most of the funds raised for themselves.

According to Wisniewska (2018), the aforementioned ICO risks, poor presentation of the project and the lack of information, resulting in increased investor distrust may lead to insufficient demand for coins, which would complicate the achievement of the set financing targets and ICO results. Various factors that influence the results and success of ICO are widely explored in scientific literature. Researchers often take into account and compare the results with research on the success factors of crowdfunding (Ahlers, Cumming, Günther and Schweizer, 2015). Scientists also analyse the impact of information disclosure (Blaseg, 2018), company technological capabilities (Fisch, 2018), human capital (An et al. 2019), social network (Albrecht et al. 2019), expert ratings (Boreiko and Vidusso, 2018, Rhue, 2018), other factors (Ante et al., 2018, Momtaz, 2018, Lee, Li and Shin, 2018, Burns and Moro, 2018, Amsden and Schweizer, 2018, Fenu, Marchesi, Marchesi and Tonelli, 2018, De Jong et al. 2018, Adhami et al., 2018). Nevertheless, it is often stated that there is a lack of generalized conclusions on ICO success factors and more specific methodological guidelines for investors or companies, which also increases the uncertainty and risk of the ICO market. Adhami et al. (2018) states that the understanding of the success factors of ICO campaigns is crucial for the structuring of future coin sales, as it signals the key factors that influence the success of a project, which is what the potential investors seek. According to Rhue (2018), there are limited practical recommendations for companies seeking to raise funds through the ICO on what factors or decisions may determine the success of the project. They are also supported by Fisch (2018) stating that despite the great interest of investors, companies and government institutions in the ICO, it is still little known about the dynamics of ICO as a funding mechanism and it is unclear what factors affect the amount of capital attracted by the ICO.

It is evident that the growing popularity of ICOs is due to a number of its advantages, such as the high level of return, high liquidity, speed of fundraising and cost minimization, high availability, that increasingly encourages innovative investors and companies to forget traditional ways of financing. Nevertheless, the ICO market is

young, indefinite, constantly growing and changing, faced with significant risks of poor regulation and investor protection, asymmetry of information, and possible fraud. According to Chen (2018), the ICO, which is still underdeveloped and controversial, will continue to develop in the future, which will allow it to become increasingly important in the financing of innovation and entrepreneurship. Due to the identified shortcomings of ICOs, in particular asymmetry of information and insufficient regulation, it is difficult for market participants to assess the ICO fairly and relatively easily and to make appropriate investment or financing decisions that could minimize the risks associated with ICOs as much as possible. The ICO, taking into account all its advantages, is becoming more and more frequent, but so far it has not been thoroughly researched and it is not clear how its advantages, risks and other factors affect its success. Investigating ICO success factors can benefit both potential investors looking for ICOs to invest successfully and understand how to identify project-related factors and their impact on its success, as well as start-ups and other companies seeking to use ICO successfully and attract funds in such a volatile market. In most of the research articles analyzed, the need for further ICO success factors research is indicated and considering the novelty, volatility, emerging risks, growing popularity of the ICO market and the lack of research in the scientific literature, concrete conclusions and methodological recommendations, it is important to investigate the factors that influence the success of the ICO the most.

4. Evaluation of ICO success

There are a lot of different measures of success used in the scientific literature, while analysing the ICO success factors and their impact on ICO results (see Figure 3). Many scientists use more than one ICO success measure in their research and investigate the influence of the various factors they have chosen. The first ICO studies were based on the results of previous research on crowdfunding, IPO or other funding methods that are often compared to ICOs. Nonetheless, not all the measures of success used to assess other funding methods can be properly adapted to the ICO. According to Amsden and Schweizer (2018), the implementation of ICO requires the development of a new revolutionary technology, the decentralization of existing technologies, most of its implementing companies are only in an idea or at a very early stage of life, so there is a significant likelihood of significant changes in those companies concept from the beginning of the ICO to the final product development. In view of the challenges it poses, comparing product yields with the set goals, delivering on time, achieving the set maximum amount of attracted funding, unlike in the case of crowdfunding, are not proper measures of ICO success. Ahlers et al. (2015), while investigating the success factors of crowdfunding, as one of the measures of success use the number of investors, which in case of ICO would not normally be possible due to the potential anonymity of the investors (see Figure 3)..



Fig. 3. ICO success measures that are most often analysed in the scientific literature

One of the most widely used ICO success measures in the scientific literature is its attracted amount of funding. According to Boreiko and Vidusso (2018), in view of the complexity and riskiness of the blockchain based start-up, it would often not be possible to successfully implement the project without the availability of a certain

budget. Rhue (2018), Ante et al. (2018), Blaseg (2018), Boreiko and Midlands (2018), Fisch (2018), Lee et al. (2018), Momtaz (2018), Burns and Moro (2018), Albrecht et al. (2019), An et al. (2019), Amsden and Schweizer (2018), De Jong et al. (2018) measure the success of the ICO by the amount of funds attracted and identifies it as a measure of success for the entrepreneurs. Its popularity is also noted by An et al. (2019) pointing out that this ICO success measure is widely used in scientific literature and is the most accurate measure of company access to external funding through the ICO. Fisch (2018) also agrees and points out that the amount of funds raised is the most commonly used measure of success in the research of the funding of entrepreneurship. According to Boreiko and Vidusso (2018), this is a fairly intuitive measure of investor interest and belief in the project. The success is measured by the amount of money attracted not only in the case of ICO. Ahlers et al. (2015) also use this measure of success in researching the success factors of crowdfunding, which is often compared to ICO.

Also, the authors often use other ICO success measures related to the amount of funding attracted in their research. Quite often, the amount of funding attracted by the ICO is compared with the established minimum amount of funding, which is called a softcap. Adhami et al. (2018), De Jong et al. (2018) and Lee et al. (2018) agrees, that the ICO can be called successful if it has reached the set minimum funding target. In most cases, when the minimum funding threshold is not reached, the company does not receive any funding because, as Adhami et al. (2018) said, in that case investors usually retrieve their invested funds. Adhami et al. (2018) states that ICOs may be unsuccessful and attract a very small amount or no funding due to low demand for coins offered, security flaws, cyber attacks, potential fraud, etc. According to Boreiko and Vidusso (2018), this ICO success measure is particularly appropriate given that once the minimum funding amount is reached, the entrepreneurs have sufficient funds and can start implementing a new project. On the other hand, the use of this definition of success may not always be reasonable, as, according to Boreiko and Vidusso (2018), this measure does not take into account the amount of funds that is missing to reach the target amount and there may be such ICOs for which the minimum funding amount is not even established. For this reason, Fenu et al. (2018) decided to extend this definition of ICO success by arguing that there is often a lack of data on the set minimum amount of funding attracted by the ICO and that sometimes the ICO provides provisions to implement the ICO, even if the minimum funding amount is not reached. Based on this, Fenu et al. (2018) argues, that a successful ICO is the one attracting more than 200 000 dollars. In the absence of a minimum threshold for attracted funding, Lee et al. (2018) says that a successful ICO is the one that has succeeded in attracting more than 500 000 dollars.

Some scientists use other various measures of the amount of funding attracted. De Jong et al. (2018) and Lee et al. (2018) says that the success of the ICO is also measured by the percentage of funds raised of the maximum amount of the funding set, which is called a hardcap. Blaseg (2018) argues that a successful ICO is able to attract any amount of funding.

Another common definition of ICO's success in scientific literature is the listing of its coins on various virtual platforms. De Jong et al. (2018), Blaseg (2018) points out that successful ICOs are those whose coins are traded on at least one of virtual exchange platforms. This definition of the success of ICO is most important for Amsden and Schweizer (2018) that states that listing is equally important both for investors by providing them with liquidity, as well as for entrepreneurs or companies by providing additional capital by offering unsold coins in the future. The importance of listing Amsden and Schweizer (2018) also highlights by the fact that it is often needed for successful project functioning, when the platform or product is only available to the coin owners after the end of the ICO. In that case the unlisted coins would not be available to potential users and the project would fail, despite the amount of funding attracted. Clearly, the success of crypto currencies and ICOs depends on their usability, which is why, as Momtaz (2018) claims, they are usually being listed on as many virtual exchanges as possible. Listing can also be an important signal to investors about the quality of the ICO and the company or the project itself, as Amsden and Schweizer (2018) argue that the virtual exchange platforms protect their reputation and carefully check listed ICOs to detect fraudulent or questionable value projects. On the other hand, a number of shortcomings in the use of this definition of success are highlighted. According to Blaseg (2018), measuring

ICO's success by listing only evaluates early-stage performance and does not depend on the success of ICO funding, as even not funded projects coins can be listed.

Also, ICO's success is quite often measured by the return on investment. One of the main motives for investing in ICOs is the high return they often offer to investors, so, according to Burns and Moro (2018) and Rhue (2018) ICO success is measured by Return on Investment (ROI) and named as one of the most important measures of investor success. Short-term return rates are also used. Burns and Moro (2018) and Momtaz (2018) use the first-day return to measure the success of the ICO, and Momtaz (2018) argues that successful are those ICOs whose first-day returns are positive.

The success of the ICO is also defined as the market capitalization of its coins (Rhue (2018)), when higher capitalization means a more successful ICO. As a success measure is also used a change in market capitalization. Fenu et al. (2018) unsuccessful consider those ICOs whose market capitalization has declined by more than 75 percent within six months after their listing start.

One more measure of the success of the ICO, which is quite common in scientific literature, is its duration. An et al. (2019) measure ICO success by its length of days, showing how quickly a young company can attract funding and is labeled as a reflection of the quality of the company and the ICO itself. The shorter duration is considered to be the attribute of success of the ICO, and Lee et al. (2018) says that a highly successful ICO usually ends when their hardcap is reached and a longer funding campaign distracts the management who needs to focus on product development. This measure of success is also used by Ahlers et al. (2015) while examining the success of crowdfunding as it is particularly important for young and fast-growing innovative companies, seeking to get funding as soon as possible. Other alternative duration indicators are also used. Momtaz (2018) measures the success of the ICO by the time to market which assesses the number of days since the project was created until the start of the ICO.

Finally, various indicators are used to define the success of the ICO after its completion. De Jong et al. (2018) argues that a successful ICO after its completion is the one that still has active project's web site, its project team post at least one tweet on Twitter, use the Github repository six months after the end of the ICO and measures ICO success by the number of tweets a week from the start of ICO to six months after its end. In this case, the activity on social networks is used to measure the success of the ICO, which usually only happens if the company successfully implements the ICO and attracts a sufficient amount of funding to start and continue its activities.

Thus, it is clear that in the scientific literature the success of the ICO is defined by a number of different indicators and there is no consensus on which one is most appropriate. Nevertheless, it can be concluded that the most commonly used indicator defining the success of the ICO important mostly for entrepreneurs is the amount of funding attracted by the ICO. In terms of indicators defining the success of investors, ICO's return on investment is most often used. Also, the widely used ICO success measure is the listing of the coins on a variety of virtual platforms, which is important and defines the success of both investors and companies or entrepreneurs.

Conclusions

Rapid changes in financial technology caused by the emergence of the blockchain, inflexibility of the financial sector, excessive regulation and inability to adapt to the ever-changing needs of small debtors have led to the emergence of previously unheard of, alternative, innovative, digital funding mechanisms. Although there are a lot of strengths and weaknesses of the ICO mentioned in the scientific literature, the analysis of the ICO success indicators suggests that the most commonly used indicator for the success of companies or entrepreneurs is the amount of funding attracted by the ICO. In terms of indicators defining the success of investors, ICO's return on investment is most often used. Also, widely used ICO success measure is the listing of coins on a variety of virtual platforms, which is important and defines the success of both investors and companies or entrepreneurs.

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Alfreda ŠAPKAUSKIENĖ Associate Professor, PhD of Social Sciences field, Management and Administration, Researcher of Sustainable Economy Research Group, School of Economics and Business, Kaunas University of Technology and Assoc. Professor, Department of Finance, Faculty of Economics and Business Administration, Vilnius University. Research interests: Finance, FinTech, Blockchain, Cryptocurrency, ICO, IFRS, Personal Finance, Behavioral Finance.
ORCID: 0000-0002-0070-4097

Ingrida VIŠINSKAITĖ is a Master's student of Accounting and Auditing at Kaunas University of Technology, School of Economics and Business.
ORCID: 0000-0002-9568-8762

Register for an ORCID ID:

<https://orcid.org/register>

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SCIENTIFIC PRIORITIES AND REAL PROSPECTS FOR COST OPTIMIZATION IN FORMULATION DEVELOPMENT

G.T. Glembotskaya¹, S.Yu. Eremin², E.E. Chupandina³

^{1,2}*Sechenov First Moscow State Medical University (Sechenov University), Moscow, Bolshaya Pirogovskaya Street, 19, Bld. 1, Moscow, 119146, Russia*

³*Voronezh State University, Universitetskaya Sq., 1, Voronezh, 394018, Russia*

E-mails:¹ glembotskaya@rambler.ru; ² stas_16_06_92@mail.ru

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Abstract. As a result of the systematic structural analysis of the collected scientific data on the problem under study, the trends in the development of the pharmaceutical sector that have established in the global space, including the Russian Federation, have been marked, the changes in the modern healthcare systems have been noted, and it has been proven that the problem of finding accelerated and efficient methods of drug development that meet the interests of all stakeholders needs the priority solution. The structure of distributing the clinical studies of drugs in the world practice has been presented, and data on the funds for the development of the main stages of the process under study and therapeutic groups of drugs for various nosologies have been presented. The main difficulties of objective assessment of the formulation development costs have been defined, the influencing factors have been identified, and the methodical approach to calculating the resources spent has been proposed. The results have been summarized, and the prospects for the rational use of the advanced information technologies for the development and support of innovative domestic developments in the pharmaceutical sector have been demonstrated. As a result of the research into the scientific data, a real opportunity to optimize the costs of developing innovative drugs through their repositioning has been demonstrated for the first time, the conceptual methodical approach to solving the identified problems has been justified, and prospects for its implementation have been outlined, with due consideration for the further development of the pharmaceutical market and the introduction of personalized pharmaceutical care. The study has been conducted on the basis of systematic analytical structuring of the information data and the results of independent research with the identification of global trends and the determination of practical significance, as well as scientific perspectives in the field under study.

Keywords: drug development; stages of development; efficiency of phases of clinical studies; capabilities of Artificial Intelligence in the development; cost optimization; repositioning of drugs

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JEL Classifications: O31

1. Relevance

The scientists and experts in the modern global scientific community note that the majority of states recognize the pharmaceutical industry as a priority for the innovation-driven growth of the country. Along with this, there are a slowdown in the average annual growth rate of R&D costs and a decrease in the growth rate of the original drug

segment, with a simultaneous growth in the generics segment (Sholomitskaya, 2013). The introduction of the new and increasingly expensive drugs to the market is accompanied by long-term procedures, as well as objective and subjective risks. While subjective risks are associated with the conscious actions of the market actors, objective risks are associated with the real state of the environment of the pharmaceutical industry and the related industries. These include the general level of knowledge in the natural science and medical science, the use of technological and digital platforms in chemical and biological synthesis, etc. In this context, pharmaceutical companies seek to reduce operating costs and the length of the R&D cycle, using various strategies for improving the efficiency and optimization of R&D processes, including outsourcing, Big Data, strategic partnerships, business process management, etc. (Frank, Ginsberg, 2017).

Along with changes in the pharmaceutical sector, some events also occur in the systems of public healthcare caused by the rapid growth of infectious and noncommunicable diseases threatening the world community and accompanied by the emergence of promising methods of their control. The development and introduction of new medical technologies, as well as the intensive development of personalized medicine necessitate the launch of innovative drugs with proven safety and efficacy on the pharmaceutical market (World Health Organization, 2019). It is known that the drug development, including personalized drugs, is a complex, time-consuming, costly, and labor-intensive process. Therefore, the problem of finding accelerated and efficient methods of pharmaceutical development that meet the interests of all stakeholders is of priority.

Of scientific interest are the analytical systematization of various approaches used in the world practice to optimize the cost of drug development, as well as the justification of rationalization options for this process by expanding the opportunities used in the Russian economy. From this standpoint, it is necessary and relevant to determine the development trends in the pharmaceutical industry in the global space, including the Russian Federation, conduct a structural analysis of the new drug development, identify problems of objective assessment, and justify the efficient methods to reduce its cost.

Goal of the article is to carry out a structural analysis of the drug development process and its cost evaluation with the rationale of the most priority and promising scientific and practical approaches to the cost optimization in the formulation development.

The study of the modern methods for solving similar conceptual problems has allowed to formulate the following tasks to achieve the goal: 1) justify the existence of a real opportunity to optimize the cost of developing drugs that meet the needs of the modern medical practice; and 2) form a methodical approach to building informational and mathematical models for optimizing costs that are most adapted to Russian conditions, taking into account the further development of the drug market and the introduction of personalized pharmaceutical care.

The authors selected scientific methods that allowed to ensure the reliability of the results obtained in order to solve these goal tasks.

2. Materials and methods

The method of the study is based on the principles of the systemic structural analysis and conceptual modeling. The data from the state and departmental statistics, international analytical agencies, reports of the largest pharmaceutical companies, published results of research by Russian scientists, data from independent research, as well as information from publicly available electronic databases of international organizations (World Health Organization, World Medical Organization, International Pharmaceutical Federation), etc. were used in the course of the study.

The study was conducted on the basis of a systematic critical review and analysis of the collected data and the results of independent research using various scientific methods: retrospective, content analysis, system analysis, process approach, computational analytical, economic statistical, logical, graphical, and modeling approach.

The critical analysis of scientific sources about the evolution of the drug development in historical sequence was carried out, and priority problems were identified using the methods of retrospective, systemic structural and content analysis. The process approach allowed analyzing the process of drug development and the results of clinical studies differentiated by the selected stages, steps, and phases. The structure of the pharmacotherapeutic focus of research in new drugs was determined during the systemic structural analysis, and the results of structuring were obtained using the calculation and analytical method by several cost criteria for the drug development. The economic and statistical methods were used to estimate rate changes in the growth/decrease in the average cost of drug development over time, and the trend established over the past decade was defined. The main factors influencing the increase in R&D costs were identified during the structured logical analysis. The results of the cost formation simulation in creating the original drug were presented using the graphical method.

3. Results and discussion

The critical analysis of scientific sources about the drug development evolution allowed to trace the scientific methodological approaches used to find innovative medicines, provide a situational description of the current state of this scientific and practical problem, identify the emerging challenges, and propose a conceptual approach to its solution.

According to literary data, about 4,500 companies in the world are engaged in the development of innovative medicines (new molecular units) or new biological preparations (based on proteins). The quantitative ratio of all the invented active substances in the composition is distributed as follows: 2/3 are new chemical compounds, more than 1/10 are substances of biological origin, and about 1/5 are genetic engineering ones (Nuzhnova, Gribova, 2013). The advanced high-tech approaches involve the use of the high-throughput screening (HTS) method, the main purpose of which is to identify potential candidates by screening specialized libraries of components that have desired impact on the receptor. Such a rapid scanning of biological processes allows to quickly remove the compounds with an unsuitable or zero potential from the list of substances for analysis, and thus allows to identify potential active substances and make proposals for their optimization regarding the molecule under study. However, the screening processes are not able to assess toxicity and bioavailability of substances. As such, the results of the HTS analysis provide a starting point for further steps in the drug discovery and understanding the interaction or role of a particular biochemical process.

The biological activity is modeled at the next stage using specialized software such as Quantitative Structure Activity Relationships (QSAR), which results in the creation of a highly active substance with the lowest possible side effects and financial costs of the developer during the synthesis. QSAR is implemented using one of the following approaches: 1) direct (creating an appropriate ligand suitable for a specific receptor) and 2) reverse (selecting a receptor for the existing natural ligand). The scientific principles for implementing these two approaches are based on various technologies, such as nuclear magnetic resonance (NMR), molecular genetics, 3D modeling of the active molecule using such systems as computer assisted design (CAD). The technology of full computer simulation of chemical synthesis is also used, which allows to not only find less economically costly algorithms, but also to bypass international patents by retrosynthesis. Chematica, which is programmed by developers to comply with about 50,000 rules of synthesis, can be provided as an example of such software. Based on the reactions published in the chemical literature over the past 250 years and the findings of organic chemists, each rule informs the software which transformations are possible from any given molecule. The Chematica algorithms move through this network of options to generate synthetic routes to identified targets for defining new, efficient, and selective paths. The pharmaceutical company Merck acquired this software to

improve its business processes in 2017 (Kolenov, 2019). As a result, the final choice of the synthesis process and design of potential biologically active substances is based on the experience, selectivity, and intuition of the researcher.

Research approaches to finding innovative medicinal substances constantly change. The elementary empirical screening has been the main method used for the existing or synthesized chemical compounds in recent decades (Figure 1).

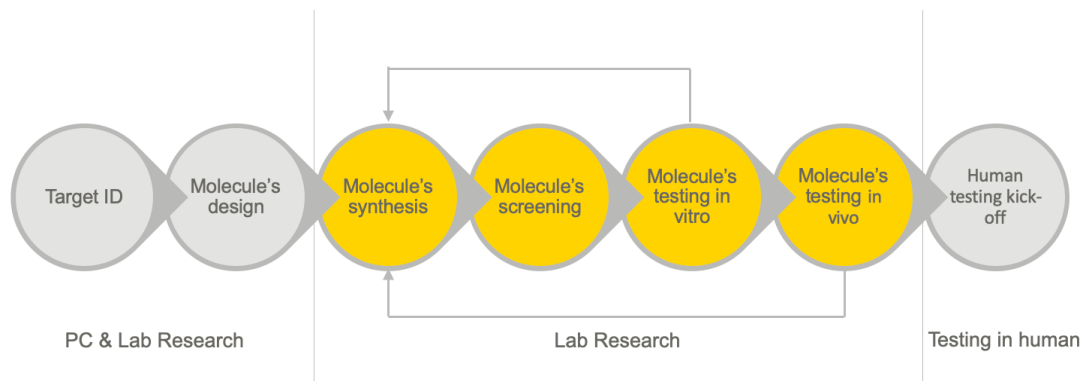


Fig. 1. Stages of the modern drug development

Source: Compiled by the authors

The Russian scientist A.V. Pogrebnyak, engaged in the study of new properties of known drugs, noted that the synthesis of new substances and their pharmacological screening had been the main method of searching for drugs until recently. Only one-fourth of the total number of the known chemical compounds (more than 60 mln) are available for research, but their pharmacological screening cannot be realized in practice due to the high cost, since it consumes most of the funds allocated for the creation of a new original drug. Virtual screening has been extensively developing in the past fifty years due to the increased availability of computing resources, which to a certain extent can compensate for the high financial costs and labor intensity of the total pharmacological screening. The use of virtual analysis allows reducing costs as soon as at the stage of the preliminary screening, where more than 98 % of the substances are screened out. Moreover, computer analysis can be used to identify a previously unrecorded pharmacological action for the already used drugs. Such an approach is economically different from the generally accepted one "synthesis first, research second", since pharmacokinetics, pharmacodynamics, and toxicity have already been studied for the known drugs, and changing their field of application does not require extensive research. This is especially relevant for certain diseases, where the search for new drugs for treatment requires great effort and financial costs (Pogrebnyak, 2013).

The transformation of the research content is evident in Figure 2.

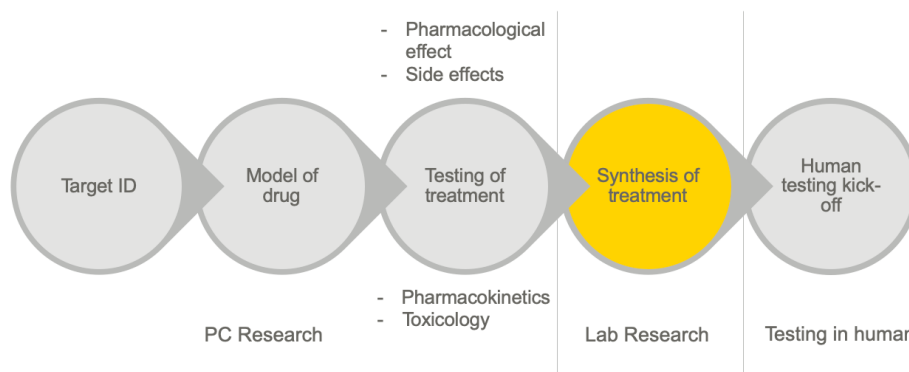


Fig. 2. Stages of the drug development using virtual models

Source: compiled by the authors

The development of the modern information technologies undoubtedly makes a great contribution to the creation of innovative drugs (Kazancheva, Gerasimenko, 2016). At the same time, computer simulation does not always guarantee the drug creation since it requires a preclinical evaluation of pharmacological properties. The use of computer modeling with a wide use of advances in genomics, proteomics, molecular biology, pharmacology, and medicine promotes a more rational and efficient development, which is manifested in the targeted synthesis of drugs with given pharmacokinetic and pharmacodynamic parameters.

As a result, the final product is a result of not only the use of the latest information technologies, combination of knowledge in the various sciences and their domains, but also the rational organization of the necessary experimental research.

As such, a well-structured sequence of the drug development and research has been established by now: the process begins with finding a biologically active molecule, hypothesizing, and creating a research project to determine the therapeutic potential of the new drug (Schuhmacher et al., 2016). Then a study is conducted using the process approach method, which allows analyzing the results of individual stages of that process and noting the following features. Only after a potential candidate for the drug has been synthesized, and its structure and properties have been defined, it is possible to decide whether the drug is ready for clinical trials and move to an extensive preclinical trials on animals that provides preliminary information about efficacy, toxicity, pharmacokinetics, and safety. Wide variations in the drug dose are tested using in vitro and in vivo experiments. An in silico profile can also be implemented using the computer models of the drug-target interaction (Ayn de Jesus, 2019). As can be seen in Figure 3, about half of the candidate substances for drugs fail to pass tests at the stage of preclinical studies in testing due to low stability, teratogenicity, high mutagenicity, and many other reasons.

According to the statistics, the potential drug fails to reach the registration process in the following cases: toxicity (30 %), insufficient clinical efficacy (27 %), unacceptable safety profile (13 %), preference for other drugs (9 %), lack of further investment (5 %), and other reasons (16 %) (Belousov, 2012).

The further use of the process approach to research was aimed at identifying reserves for reducing the temporary resources. As has been shown above, R&D of the innovative medicines is an expensive and lengthy process consisting of a series of mandatory stages.

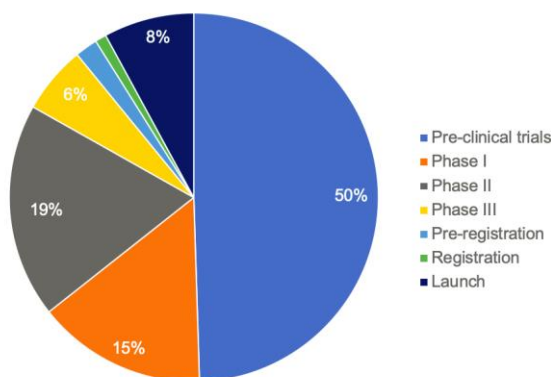


Fig. 3. Proportion of cases of abandoning the drug development at various stages, %.

Source: compiled by the authors

According to many researchers, it takes five to fifteen years to move from the idea to the drug introduction on the market. In general, the development of a new molecule (development, preclinical phase, subsequent clinical studies and obtaining regulatory approval) takes 11.8 years on average (Development of new drugs: how much does it actually cost?, 2014). The search for an innovative active molecule takes three to six years. According to statistics, only 2 – 3 % of the molecules under study move to the next stage. The subsequent R&D process of the identified substance can take up to a decade. This includes preclinical studies, which take approximately two years. Clinical studies involve four phases, three of which last from six to seven years. After this, registration and production take up to two years.

However, once the drug becomes available to consumers, phase IV of clinical trials comes, called post-registration or post-marketing. They are usually carried out after the launch of the drug sales in order to obtain more detailed information about its safety and efficacy. The results of its use in various groups of patients and with various risk factors are usually analyzed in this phase, with the detection of previously unknown and rarely encountered side effects. Along with this, new properties can be found in the already registered drug, and data for registering its new indications can be obtained, the prospects for creating a new delivery or research system and registering a new, more rational dosage form can be proposed, taking the patient's age into account, which contributes to the personalization of pharmaceutical care (Jain, 2019). Besides, the analysis of the results of registering some drugs for new indications suggests that this contributes to the reduction of the duration of the development process because certain types of clinical research become optional, and their duration may vary. The length and cost of the marketing research of the pharmaceutical company for this product are also reduced (Belousov, 2006). See Figure 4.

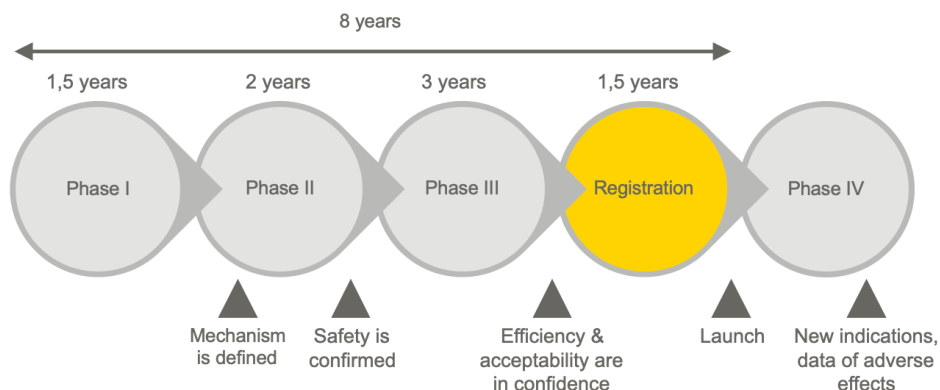


Fig. 4. Chart of the sequence of clinical studies phases, their average length and impact
Source: Compiled by authors

The structure of the pharmacotherapeutic focus of research in new drugs is represented by the following data: 31 % are related to the search for drugs in oncology, 14 % are related to the creation of new drugs for the treatment of various infectious diseases, and about 13 % are related to scientific developments in the therapy of cardiovascular diseases. The remaining part of the structure is represented by the most relevant research in the creation of new anti-diabetic, anti-inflammatory drugs, medicines for the treatment of various mental diseases, etc. (World Health Organization, 2019). A chart of the distribution of the global clinical studies of drugs in various therapeutic groups in 2018 is represented in Figure 5, which indicates that 2/5 of all studies are conducted in oncology. Currently, most drugs are in Phases I and II of clinical studies because not all studied drugs move to the next stages.

The likelihood of a successful clinical study is subject to classification by type of disease. For example, it is relatively easy to do a blood test and monitor the efficacy and safety of a new drug in infectious diseases, but this task is much more complicated in the case of cancer or cardiac diseases.

According to statistics, the focus of all scientific research in pharmaceutical development is distributed as follows: 70 % are focused on the synthesis of an innovative molecule, about 24 % are aimed at identifying a new dosage form, improving dosage, etc., and the remaining 6 % are studying new indications of the already existing drugs (Nuzhnova, Gribova, 2013).

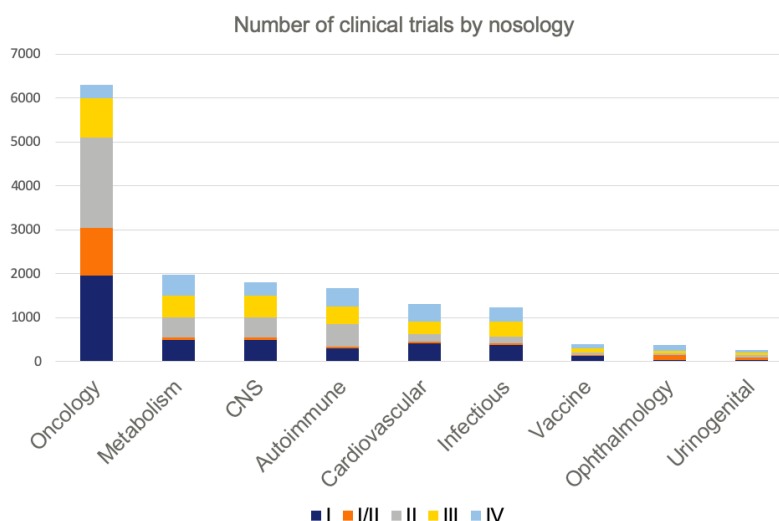


Fig. 5. Structure of the distribution of clinical studies of drugs by nosology in the world practice in terms of phases, items
Source: compiled by the authors

According to the results of the express survey of 35 leading experts from a number of pharmaceutical companies, a decision on repositioning is most often based on the opinion of medical practitioners about the effects of drugs that are not presented in the instructions (57 % of the respondents), as well as the analysis of data from various clinical studies, including retrospective, observational, etc. (43 % of the respondents). The programs for repositioning drugs used in medical practice are already developed.

Repositioning allows saving hundreds of millions of US dollars by eliminating the need for a series of studies on pharmacokinetics, carcinogenicity, acute and chronic toxicity, including cardiotoxicity, nephrotoxicity, allergenicity, etc., even though the second and the third phases of clinical studies are unavoidable and costly. The research laboratories have accumulated numerous data on new therapeutic effects of the known drugs, which remain unclaimed due to the lack of investment in large-scale clinical studies. Charitable foundations are most often the main sources of funding for clinical studies on the drug repositioning. For example, the required \$50 mln to finance the "Metformin against aging" clinical study was collected by the American Federation for the Study of Aging (Pryor, Cabreiro, 2015).

The length of development of an innovative drug has the most obvious impact on the cost of the development process. The authors carried out a structured analysis of the cost of the drug development over the past decades in the course of the independent research, using the data from domestic and foreign scientific sources structured according to several criteria. It was revealed that the cost of developing an innovative drug was one of the most variable values: it ranged from \$1 bln to \$11 bln in the scientific publications of various authors. Some experts believe that pharmaceutical companies (especially large ones) try to overestimate this forecast, thus justifying high prices for new drugs. It is not beneficial for large pharmaceutical companies to make the true information about their development costs publicly available. Therefore, it is important to take into account that any estimates of the cost of developing an innovative drug can only be very approximate (Emanuel, 2019). The inconsistency in determining the cost structure for developing a new drug is one of the reasons for such a significant disagreement in cost estimates. Besides, the studies conducted in recent years most likely use databases not related to each other.

The Tufts Center for the Study of Drug Development published the results of its research in May 2018, where the average R&D costs for innovative drugs were estimated. The resulting amount is \$2.6 bln, and includes \$1.4 bln of direct investments and \$1.2 bln of an expected cash return to investors in the long-term development. Taking the cost of the post-marketing research into account, this amount increases to \$3 bln. It is also noted that the likelihood of the successful completion of Phase III of clinical studies and the release of the drug to the market by regulatory authorities has almost halved over the past four years, and is no more than 12 % (it was 21.5 %, according to the previous study in 2014) (Sullivan, 2018; Farm giants are going to use blockchain to reduce the cost of the drug development, 2018). As a result of processing the collected data, the established trend in the dynamics of the rate of growth/decrease in the average cost of the drug development over the past decade was defined. A chart presented in Figure 6 indicates their sharp growth over the past five years.

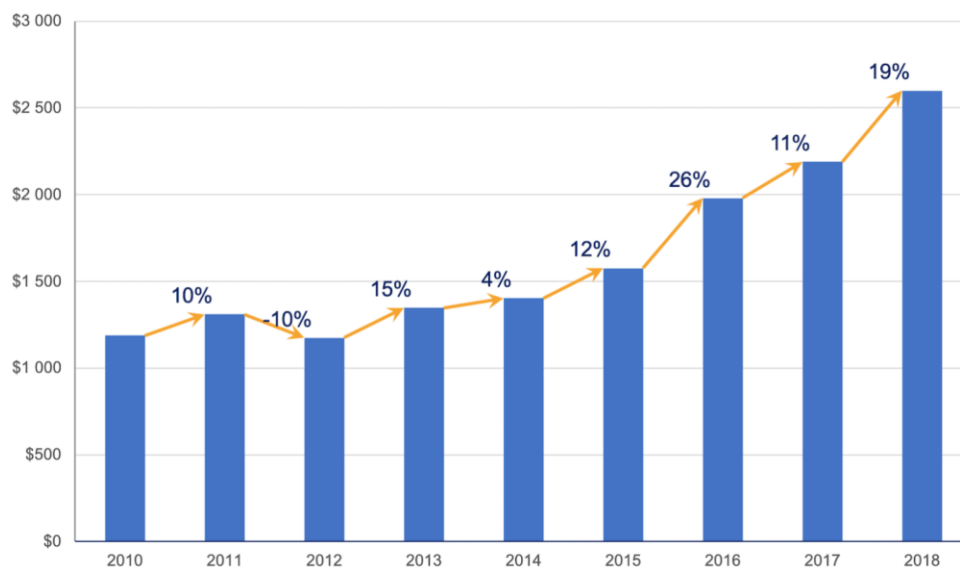


Fig. 6. Dynamics of growth in average costs for the drug development from the discovery to the market launch from 2010 to 2018, USD mln

Source: compiled by the authors

The generalized processing of the obtained data allowed presenting the fractional structure of the phased cost distribution in the integrated form:

- 24.8 % for research, development, and preclinical studies;
- 57.6 % for conducting clinical trials (57.6 % were distributed among the three stages as follows: 8.1 % for the first stage, 12.8 % for the second stage, and 36.7 % for the third stage);
- 6.4 % for registration;
- 9.1 % for post-marketing research; and
- 2.1 % for other costs.

As can be seen in Figure 7, almost two-thirds of the costs fall on the first three phases of clinical studies, while the costs of the post-marketing research in the last phase are allocated separately (The pharmaceutical industry in figures, 2012).

Some researchers believe that the development costs can be either well below or well over \$1.5 bln, since they depend on the specifics of creating an innovative drug, including the type of disease. For example, T.A. Khonl pays special attention to the specific factors of the development cost amplitude, noting that the cost of an innovative drug varies significantly in therapeutic classes, in particular. This is due to the fact that the drug development for certain classes has an unequal probability of success in clinical studies, and the difference in the

length of development for drugs of a certain class is even more noticeable (Khonl, 2013). Innovative drugs created to control cancer and neurological and respiratory diseases have the longest length of launch on the market.

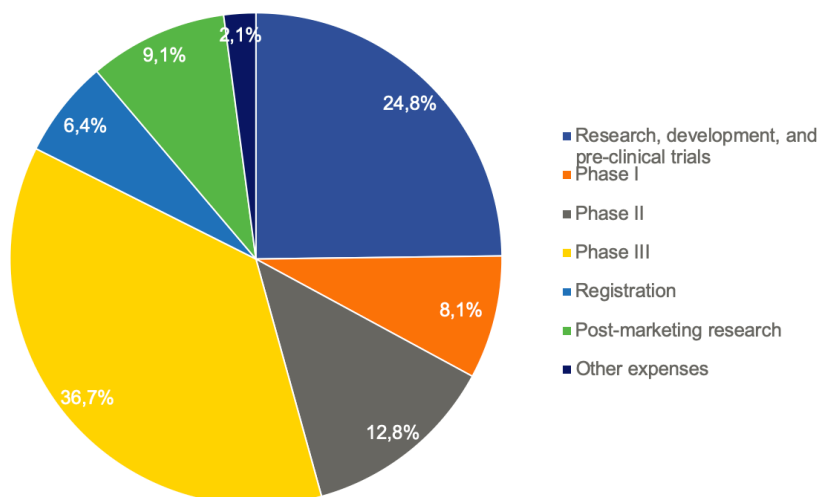


Fig. 7. Quantitative ratio of the costs of developing and introducing drugs to the market by stages, %
Source: compiled by the authors

D.Yu. Belousov notes that most of the drugs are now developed in small and medium-sized companies, whose innovation costs differ significantly from Big Pharma. This became possible due to high mobility, low overhead costs, more efficient management, and high labor productivity (Belousov, 2006).

The estimated costs of developing a new drug for various therapeutic classes are presented in Table 1 (USD mln):

Table 1. Costs of developing a new drug by nosology, USD mln.

#	Nosology	Cost, USD mln.
1	Blood diseases	1,164
2	Cardiovascular diseases	1,140
3	Skin diseases	870
4	Genitourinary diseases	816
5	HIV/AIDS	694
6	Cancer	1,339
7	Musculoskeletal diseases	1,216
8	Neurological diseases	1,306
9	Parasitic diseases	583
10	Respiratory diseases	1,457
11	Diseases of the nervous system	833
12	Average value	1,038
13	Standard deviation	±289,9

Source: compiled by the authors

According to the Investopedia information financial base, pharmaceutical companies spend about 17 % of their income on R&D on average, which puts the industry in the top by this indicator (Kenton, 2018).

A structured analysis of the use of approaches to optimize the cost of developing innovative drugs used in the domestic and foreign science and practice gives grounds to identifying the key factors influencing the growth in R&D costs:

- increase in the number of "unsuccessful" molecules (up to 50 %), the efficiency of which failed to prove at the stage of preclinical studies;
- current trend to increase the number and length of the studies, including research for marketing purposes;
- priority of the drug development for chronic and degenerative diseases that require longer clinical studies, due to the need of longer administration to achieve the result and a more careful study to detect delayed side effects;
- increased commercialization of research (companies more often have to pay for access to research results that were publicly available in previous years);
- increase in the average length of the preclinical studies phase;
- increase in the share of extended international multicenter clinical studies;
- focus on biotechnological drugs that are more difficult to create and study; and
- reduction of the state funding of pharmaceutical R&D.

As a result of the study, the authors have identified the real reserves to reduce the influence of some factors listed above. In recent years, cooperation has become one of the key adaptation factors for the development and solution of some problems in the pharmaceutical industry. The outdated patents, complex diseases, tough regulatory environment, and new technologies are just some of the reasons why individual pharmaceutical companies enter all sorts of collaborations with R&D laboratories, research institutions, non-profit organizations, and even competitors (Buvailo, 2018; Motlagh, 2018).

Transformation of the R&D through a number of innovative technologies plays a major role in optimizing the development costs. These include Artificial Intelligence, real data, robotic and cognitive automation, social networks, mobile devices and telemedicine, which have the potential to improve the research design and decision making, simplify the recruitment of doctors and patients, and improve the efficiency and accuracy of repetitive tasks, up to submitting information to regulators. The modern technologies can lead to a dynamic and sustainable progress in the pharmaceutical industry, focused on achieving high values that are important for the future of global healthcare (Eremin, Glembotskaya, 2019). According to many experts, the industrialization of innovative technologies in biopharmaceutics will lead to numerous transformational changes in the operation of the industry, especially in R&D (World Economic Forum, 2017).

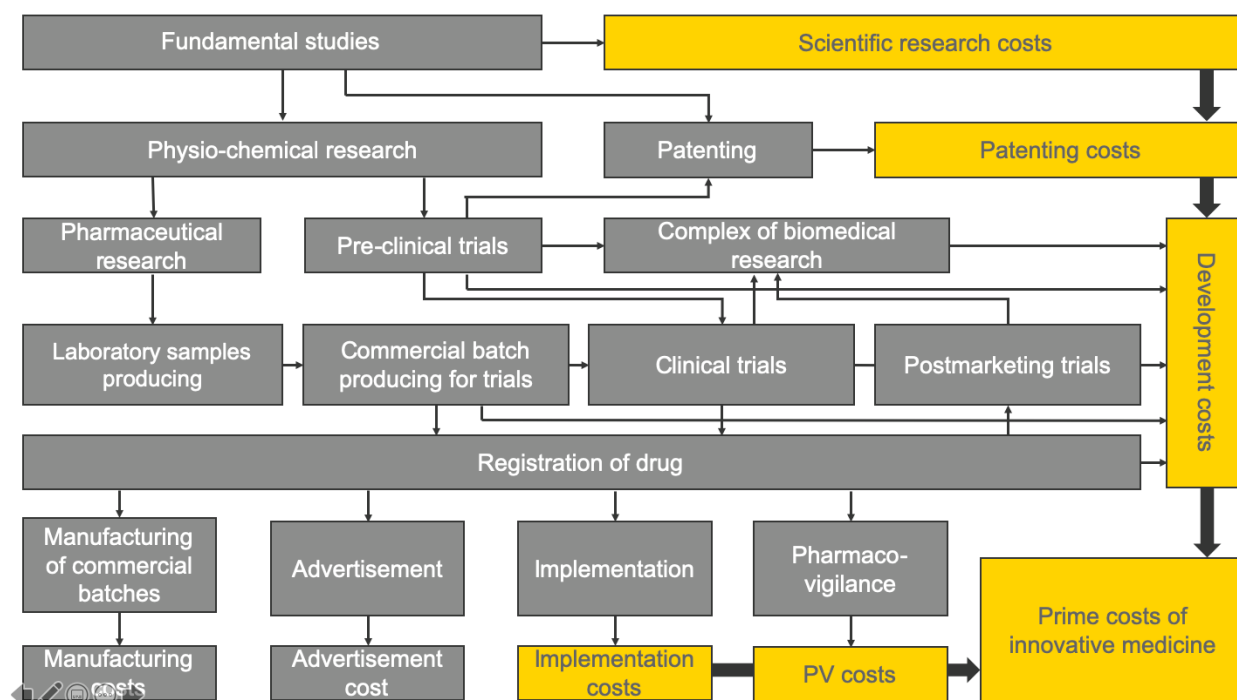
A more detailed study of the results of using the capabilities of the Artificial Intelligence by global biopharmaceutical companies indicated that the algorithms presented in its applications were capable of analyzing large amounts of data from such sources as reports on preclinical and clinical studies, medical records, and genetic profiles. It is able to recognize patterns and trends within these data and develop hypotheses much faster than the researchers. Possessing an extensive array of information on drugs and research results, the Artificial Intelligence quickly analyzes the available information and provides assistance to researchers with the search and new ideas.

Since the traditionally used method of screening a large number of compounds and molecules to identify potential candidates is a long and expensive process, the Artificial Intelligence is potentially able to carry out this process faster and at a lower cost through the classification of drugs into categories of therapeutic use with a high degree of accuracy. It is important to note that even incorrect answers given by the Artificial Intelligence can be useful because they can identify the secondary use (properties) of a drug that scientists would not have considered (Conroy, Conroy, 2019).

The above advantages of innovative technologies are aimed at optimizing the development costs and contribute to the active transformation of the R&D processes in the pharmaceutical sector of the economy in the country.

The analytical generalization of the scientific data indicated that the costs of developing innovative drugs could be significantly lower in Russia than in the US and Europe because the Russian government supports domestic producers. The deployment of the modern domestic R&D system is facilitated by a mechanism of the competitive targeted funding for economic agents by the state, which allows the former concentrating on the most promising areas (development of innovative antibiotics, orphan drugs, and bioprinting of tissues and organs) (Global Data, 2017; Jena, 2018).

The studies of the authors are systemic, and the results obtained are basic for modeling the process of optimizing the costs of the drug development (Glembotskaya, Ivanov, 2017; Glembotskaya, Eremin, 2019). They build the basis for the formation of an algorithm for a conceptual methodical approach to a more differentiated step-by-step estimation of the costs of the development, research, and launch of a drug on the market (Figure 8).



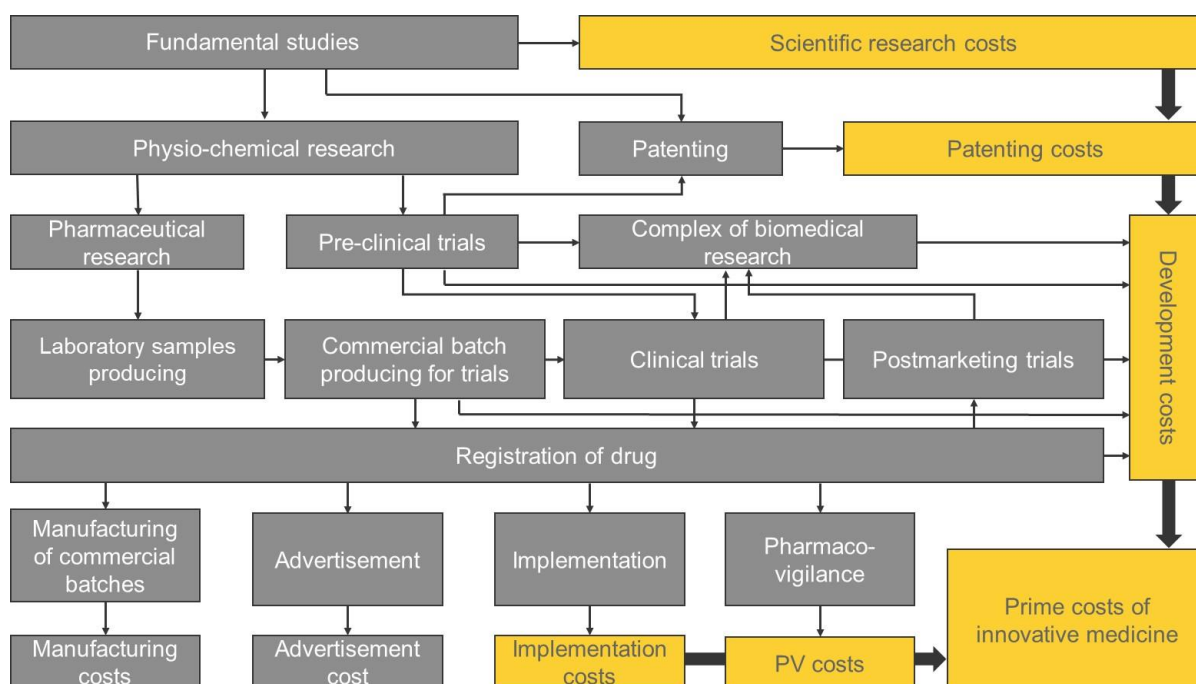


Fig. 8. Model chart of the cost formation when creating the original drug

Source: compiled by the authors

The further plans of research include the development of a transformed model for optimizing the costs of the pharmaceutical development, taking into account the domestic drug market development, including new paradigms for creating innovative drugs and personalization technology, which is intended for use by pharmaceutical companies as a tool for the rational resource planning. A promising area in mobilization of the identified reserves of reducing the length and cost of pharmaceutical development is a wider use of the advanced information technologies based on the formation of the appropriate scientific basis.

Conclusions

1. The structured analysis of the scientifically justified approaches existing in the world practice to optimize the cost of the drug development has been carried out. The amounts of the consumed funds have been analyzed in terms of the main stages of the process under study and therapeutic groups of drugs for different nosologies. The key difficulties of the objective evaluation of the pharmaceutical development costs have been defined, and the influencing factors have been identified.

2. The scientific and practical approaches to the drug development cost reduction that are most adapted to the Russian conditions and corresponding to the scientific level and the needs of the modern medical practice have been identified, taking into account the prevailing global trends in the pharmaceutical market. The list of factors contributing to higher costs for pharmaceutical development has been formed, and real reserves for their reduction have been identified, taking into account the specifics of the domestic R&D system development, which necessitates the development of cooperation and transformation of processes through a number of innovative technologies.

3. The real opportunity to optimize the costs of the drug development in order to make rational use of the R&D funds by pharmaceutical manufacturers has been theoretically justified and demonstrated by scientific evidence, which will ultimately contribute to providing the modernized personalized medical and pharmaceutical aid to the

population. It has been proven that the priority way to reduce the cost of the drug development is the careful formulation and implementation of post-marketing research programs by pharmaceutical companies, during which there is a real opportunity to identify additional effects of drugs and to reposition them.

4. A scientifically proven prospect of optimizing the cost of developing highly efficient and safe drugs with high social significance through repositioning is not only described by scientific novelty for the first time, but also has a practical focus. The prospects for the further development of the conducted research to solve the problem of finding accelerated and efficient methods of the drug development by domestic and international scientific community have been revealed.

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G.T. GLEMBOTSKAYA

ORCID ID: orcid.org/0000-0002-4193-8973

S.YU. EREMIN

ORCID ID: orcid.org/0000-0003-4463-5369

E.E. CHUPANDINA

ORCID ID: orcid.org/0000-0003-2310-4198

Register for an ORCID ID:

<https://orcid.org/register>

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EXTERNAL ASSURANCE ON SUSTAINABILITY REPORT DISCLOSURE AND FIRM VALUE: EVIDENCE FROM INDONESIA AND MALAYSIA*

Iman Harymawan^{*1}, Mohammad Nasih², Atila Salsabilla³, Fajar Kristanto Gautama Putra⁴

^{1,2,3,4} Universitas Airlangga, Airlangga No. 4-6, Surabaya, 60286, Indonesia

E-mails: ¹harymawan.iman@feb.unair.ac.id (Corresponding author); ²mohmasih@feb.unair.ac.id; ³atilasalsabillaaa@gmail.com; ⁴fajar.kristanto@akuntanindonesia.or.id

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Abstract. We analyze the content of assurance statements on sustainability reports to examine the extent of external assurance on sustainability report disclosure in Indonesian and Malaysian listed companies and identify their impact on firm value. This research is conducted using 84 samples of listed companies from all industries, except the financial industry, for the period 2010-2016. Ordinary least square (OLS) regression is used to test the research hypothesis. The results show a significant positive effect of external assurance on sustainability report disclosure to a firm value measured by Tobins'Q. Besides, we also found that companies in Indonesia have higher disclosure in terms of external assurance for sustainability reports compared to Malaysia. This study adds new evidence to the literature on sustainability assurance in emerging countries.

Keywords: sustainability report; external assurance; firm value; emerging countries

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JEL Classifications: Q560

1. Introduction

Presently, corporations are facing increasing pressures to be more accountable, transparent, and to disclose a wide variety of information, including information on sustainability. As part of supporting Sustainable Development Goals (SDGs) number 8 which relates to "Decent Work and Economic Growth", companies should additionally make contributions and adopt sustainable activities. To legalise the implementation of company sustainability, national governments publish the requirements and policies concerning sustainable development, including the

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Indonesian government which has several regulations, one of which is Article 74 of Law No. 40 of 2007 which relates to managing social and environmental responsibility in terms of the restriction of company liability. Meanwhile, in Malaysia, concerns on the environment have been voiced by the government, and companies are encouraged to provide information on the impact of their economic activities on the environment in their annual reports. ACCA Malaysia has played a significant role in the progress in reporting on sustainability. In 1999, ACCA Malaysia announced that there were 25 participants in the Environmental Reporting Awards (MERA). In 2003, the number had escalated to 60 participants. The event has become a growing success. In 2005, ACCA Malaysia presented the reporting standards for The Malaysian Environmental and Social Reporting Award (MESRA). MESRA was established through the reworking of various reputable guidelines for reporting, for instance the GRI (Sawani et al. 2010). It is not only national governments that require corporations to be socially and environmentally responsible but also a range of fundamental stakeholders including non-governmental organisations, investors and consumers (Gardiner et al. 2003).

As far back as two decades ago, companies began to pay a greater amount of attention to their attempts to spot and calculate conservational problems in economic reporting as more stakeholders expressed concerns about this problem (Claudia-Maria & Dragomir 2010; Nasih et al. 2019; El Idrissi et al. 2020). It causes the emergence of the consideration of corporate social responsibility information in yearly reports for various companies. The requirement for disclosure of social and environmental sustainability information is not mandatory; however, such action might increase companies' ability to accomplish sustainability objectives, by combining the outcomes of their economic, public and also environmental management activities into their reports (Çalışkan 2014). Not only could this information be disclosed as part of each company's published annual report, environmental and social information could also be disclosed separately in a standalone sustainability report. Furthermore, sustainability reports provide a different type of information to financial reports. Sustainability reports indicate the capability of a firm to create long-term value by considering its economic, social, and environmental performance (Kuzey & Uyar 2017). There has been a growing awareness of the value of and propensity for issuing standalone sustainability reports, as reported by KPMG International. In 2013, 4,100 companies worldwide were surveyed by KPMG International which lead to 71 percent of those companies engaging with Corporate Social Responsibility (CSR) reporting. In spite of this, the existence of sustainability reports does not guarantee that the quality of the reported information will increase (Junior et al. 2014). Since the legal and regulatory necessities concerning sustainability reporting have not been established yet, unethical corporations may issue inaccurate reports about the activities that involves the community and environment in which exploiting the appearance of sustainability reporting value (Delmas & Burbano 2011; Lyon & Maxwell 2011) to convince the interpretation of stakeholders (Okoye 2009). Thus, Simnett et al. (2009) argued that assurance for sustainability reports will enhance the credibility and reliability of reports and help to build corporate reputation. The issue of integrity of information disclosed in reports leads to demands for more transparent reporting.

Due to the current growth in requests for assurance of sustainability reports from third-parties, Bepari & Mollik (2016) found that the implementation of assurance was contemplated various default setting bodies on the scheme and unpaid for non-profit organisation; for example, the International Auditing and Assurance Standards Board (IAASB) has established a sustainability guarantee criterion and another not for profit-oriented organisation, Liability, has similarly established its own sustainability assurance requirement which is AA1000AS. Furthermore, as the known pioneer in standard makers for sustainability reporting, in 2000, GRI issued its initial set of sustainability report standards (GRI 1), and the newest reporting edition procedures, in 2013, GRI 4 was issued. Hence, how sustainability the implementation of assurance that accepts and supports the subject of liability for investors is a significant pragmatic matter (Bepari & Mollik 2016). Since sustainability assurance is a new discipline, there is still an absence of assurers' freedom in the procedure of assurance (Ball et al. 2000), unpredictable possibilities, conditions used and assurance arrangement levels (Kamp 2002; Manetti & Becatti 2009). To summarise, and in line with Bepari & Mollik (2016), an assurance report arranged under the AA1000AS (2008), ISAE3000 (2008) and GRI involves information such as quality and requirement, assurance

addressee, the assurance range, independence of the assurers, responsiveness, inclusivity, materiality, and assurance decisions from the perception of stakeholder liability.

When companies disclose their external assurance in a sustainability report, they hope to provide a well-defined figure to the investor, avoiding misapprehensions and misvaluations of their performance. Thus, a sign which is set by the management is reflected by the investor in terms of their valuation of the firm. To investigate this issue, we use a sample of listed firms from Indonesia and Malaysia during 2010-2016. All sectors are included in order to provide fair results in terms of a correlation between external assurance on sustainability report disclosure and firm value. The data related to the presence of external assurance on sustainability reports is derived from the sustainability reports of each company, which can be directly downloaded from company websites or from the Global Reporting Initiative database, if available. Meanwhile, data regarding each firm's financial information are derived from ORBIS. Our results indicate that firm value by proxy of Tobins'q is affected significantly by external assurance on sustainability report disclosure. This study adds new evidence to the literature on sustainability assurance in emerging countries. A prior study undertaken by Bepari & Mollik (2016) only examined, in the Australian circumstances, whether the assurance implementations enhanced the accountability and transparency of organisational sustainability reporting. Our research is also different from Bepari & Mollik (2016) in that we consider the effect on firm value, which they did not consider.

The structure of this paper is as follows: Part 2 is the literature review and hypothesis development; Part 3 gives a sample description and research variable; Part 4 includes the results and discussion; Part 5 is the conclusion, including limitations, and suggestions for this research.

2. Theory and Hypothesis Development

Legitimacy can be defined as a resource that is important for a company to function in the community. Suchman (1995) argued that the legitimacy is a functioning asset which is taken ambitiously by companies and engage it in reaching their objectives. According to the theory, organizations use a press release and various reporting to build a positive impression of the company and boost the reputation of the company and company legitimacy (Astutik et al. 2018) such as sustainability reporting and assurance as tools (Bebbington et al. 2008; Kolk 2010). Positive sustainability reporting improves the reputation of the company (Morimoto et al., 2005; Chehabeddine, Tvaronavičienė, 2020), and company sustainability reporting and assurance implementations are frequently used as sensible conceptions of legitimacy (Palazzo & Scherer 2006). Cohen & Simnett (2014) have argued that sustainability reporting and affiliated assurance implementations are both of the planned instruments used to further a company's desire to affect the community's perspective towards the legitimacy of the company. To modify the perspective of the community, organizations need to publish private information for the examination of external parties. The investor will use the information as a signal and matter for consideration when making an investment decision. As the information is given, the company management has more precise information concerning the state of the company, while investors need this kind of information when deciding to invest. Kuzey & Uyar (2017) also support the signaling theory in terms of the value creation role in sustainability reporting. This finding has significant implications for firms. If they care about sustainability issues (i.e., environmental and social), they must announce this by issuing sustainability reports. Doing so will enhance their reputations while attracting individual and institutional investors. On the other hand, the current and upcoming conditions of a firm can be measured from the firm value, which also represents the collective assessment of investors; the growth of firm value can act as a positive indicator to investors and helps investors to make investment decisions. This reflection prevents the undervaluation of firms and, at the same time, contributes to the efficiency of the market.

Reporting of sustainability information is carried out willingly by companies (Sisaye, 2011), with the sole intention of disclosing information. The voluntary nature of disclosure indicates an inclination towards

subjectivity from the management. Haigh & Shapiro (2011) argued that subjectivity might increase as a reason for the complexity caused by calculations involved in sustainability reporting. The reliability of environmental data is arguable since reporting has done as optional. Hence, the subject regarding the audit of environmental and third-party assurance is necessary to be addressed (Zhou et al. 2013). Over the past decade, the market for assurance utility that offered for sustainability reports has expanded widely (Wong et al. 2016). A survey organized by KPMG AZSA (2014) about the listed company in the Nikkei 225, showed that the amount of company that collected third-party assurances in their environmental reports had raised yearly by 17% in 2010 to 25% in 2013, according to the Sustainability Report 2014 in Japan. Moreover, the Japan Ministry of the Environment has publicized instructions regarding the technique of reliability enhancement of environmental reports (2014). The guidelines recommend the tools that can be used as the development of reliability in environmental reporting, which are self-evaluation, thorough internal audit, assurance of a third-party, and the opinion of a third party (Lee et al. 2017).

As stated by Adams & Evans (2004), the assurance objective is to enhance the quality of information, which becomes a basis for decision making amongst stakeholders. In other words, the vital function of the demand for external assurance of sustainability reporting is the desire to enhance credibility. External assurance can play a significant role that has already been proven to affect the perception of increased credibility and reliability. Hodge et al. (2009) concluded that to make information on social and environmental issues more dependable, a statement of assurance should be involved. Still, it can be more effective when the assurance comes from reliable accounting firms, which are considered to be more accurate.

Besides reporting on sustainability report-related issues, the quality of the report also matters. Companies use sustainability reporting and external assurance as tools to enhance corporate legitimacy. When companies disclose their external assurance for a sustainability report, they hope to provide transparent information for the investor to avoid misjudgment and misevaluation of company performance. Thus, the signal which is given by the management is reflected by the investor in their valuation of the firm. At the same time, it also has a significant impact on companies in terms of building a positive corporate impression. It also increasing corporate prestige which causes the sales improvement, and boosted attractiveness to clients, creditors and officials (Green & Li 2011; Kollman & Prakash 2001; Zhou et al. 2013); this also increases firm value. Based on the above discussion, we propose the formal hypothesis as follows:

H1: Higher disclosure on external assurance of sustainability reporting results in higher firm value.

3. Research Design and Methodology

3.1. Sample and Data Source

The population in the research is taken from Indonesia-based companies listed on the Indonesian Stock Exchange (IDX) and Malaysian companies listed on Bursa Malaysia, as well as information provided at <http://www.globalreporting.org>. This research relies on secondary data acquired from sustainability reports to measure external assurance on sustainability report disclosure. All financial information required is obtained from the ORBIS database. All sectors are used in this research, including agriculture, aviation, conglomerates, food and beverage products, energy, forest and paper products, media, mining, and telecommunications. This research excludes the financial industry. This research also eliminates all companies that do not have the information needed. According to those criteria, the total sample for this research is 84. Table 1 presents the observation distributions by year.

Table 1. Sample Distribution

YEAR	INDONESIA	MALAYSIA	TOTAL
2010	5	4	9
2011	5	5	10
2012	8	5	13
2013	7	6	13
2014	7	6	13
2015	8	5	13
2016	7	6	13
TOTAL	47	37	84

3.2 Operational Variable Measurement

External Assurance on Sustainability Report Disclosure: External assurance on sustainability report disclosure (DASR) is used as the independent variable in this research. This variable is measured using the contents of assurance statements proposed by Bepari & Mollik (2016), which is calculated by counting the contents of the assurance statements disclosed by a company, 1 or 0. If an item is disclosed, it will be valued 1, and the total disclosed criteria would be summed. Table 2 provide the detail criteria of DASR.

$$\text{DASR} = \frac{\text{Total Disclosed}}{14} \times 100\% \quad (1)$$

Table 2. Information Content of External Assurance on Sustainability Report

No	Contents of the Assurance Statements
1.	Intended users of the assurance statement
2.	The responsibility of the reporting organisation and of the assurator
3.	Assurance standard/s used
4.	Description of the scope, including the type of assurance provided
5.	Description of methodology
6.	Any limitations
7.	Reference to criteria used
8.	Statement of level of assurance
9.	Findings and conclusions concerning adherence to the AA1000AP
10.	Principles of Inclusivity, Materiality, and Responsiveness
11.	Findings and Conclusions
12.	Observations and/or recommendations
13.	Notes on independence and competence of the assurator
14.	Name of the assurator

Source: Bepari and Mollik (2016)

This research uses the firm value as the dependent variable. Previous research has contributed to this research in several ways. The dependent variable of firm value was taken from previous research (Cho et al. 2014; Kuzey & Uyar 2017; Lee et al. 2017; Loh et al. 2017). As suggested by Bharadwaj et al. (1999) and Konar & Cohen (2001), standard accounting measures of performance, such as return on assets, cannot evaluate the future profit potential of such practices. To overcome the limitations of these standard accounting measures, Jiang et al. (2007) stated that book value is a reasonable adjustment. Singh et al. (2017) considered Tobin's Q as their proxy for

measuring firm value. Hence, the market value to book value (MV-BV) ratio refers to Tobin's Q, which is also used in this research. Market capitalization is measured by the number of outstanding shares times the market price per share.

$$\text{Tobins'q} = \frac{\text{Market Capitalization}}{\text{Total Assets}} \times 100\% \quad (2)$$

Following prior study (Kuzey & Uyar 2017), this research uses firm size (FSIZE), profitability (ROA), leverage (LEV), and liquidity (LIQUIDITY) as the control variables. We also add a year fixed effect to ensure that our result is robust. We need to control the year as various regulations related sustainability emerges during past years, so there is a possibility that sustainability report issue from year to year is changing. The detail definition of the variables is provided in Table 3.

Table 3. Variabel Definition

	Variable	Proxy	Source
Dependent: Firm Value	TOBINSQ	Market capitalization divided by total assets	ORBIS
Independent: External Assurance on Sustainability Report Disclosure	DASR	Contents of the assurance statements proposed by Bepari and Mollik (2016). 1 or 0, if discloses each content will be valued 1 and the value of 0 when each content does not disclosed by companies	GRI Database
Firm-level Control: Firm Size	FSIZE	Natural logarithm of total assets	ORBIS
Leverage	LEV	The ratio of total liabilities to total assets	ORBIS
Profitability	ROA	Net income divided by total assets	ORBIS
Liquidity	LIQUIDITY	Current ratio, which is current assets divided by current liabilities	ORBIS
Country-level Control Economic Growth	ECO_GRO	Percent change in the GDP from one year to the next	The Global Economy
GDP per Capita	GDP_CAP	Gross domestic product divided by the population	The Global Economy
Investment as % GDP	INV_GDP	Purchases of new plant and equipment by firms, as percent of GDP	The Global Economy
Industry as % GDP	IND_GDP	Value added of the industrial sector as percent of GDP	The Global Economy
Inflation Rates	INFLATION	Percent change in the Consumer Price Index (CPI) from one year to the next	The Global Economy
Government Effectivess	GOV_EFFECT	The index of Government Effectiveness captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.	The Global Economy
Regulatory Quality	REGU_QUA	The index of Regulatory Quality captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.	The Global Economy
Political Stability	POL_STABLE	The index of Political Stability and Absence of Violence/Terrorism measures perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism.	The Global Economy
Natural as % GDP	NATURE_GDP	Total natural resources rents are the sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents, and forest rents divided by GDP	The Global Economy
Human Development Index	HDI	The Human Development Index for Indonesia published by the United Nations is a composite measure including life expectancy, educational attainment, and income level. It aims to measure not only incomes but life quality as well.	The Global Economy

4. Result and Discussion

4.1. Descriptive Statistics

Table 4 provides descriptive statistics of all research variables in this study. An external assurance on sustainability report disclosure is measured using the contents of the assurance statements proposed by Bepari & Mollik (2016), which is calculated by counting the contents of the assurance statements disclosed by the company, 1 or 0. If an item is disclosed, it will be valued 1, and the total disclosed criteria would be summed as stated in section 3. The variable name used is DASR. The highest DASR value is 1, and the lowest value is 0.571. Following the result, the descriptive statistic table is provided with other control variable mean, median, minimum, and maximum values. Also, it shows that, on average, companies in Indonesia have higher disclosure in sustainability reports compared to Malaysian firms.

Table 4. Statistic Descriptive

Variable	Mean	Median	Minimum	Maximum
<i>TOBINSQ</i>	2.527	0.945	0.040	17.950
<i>DASR</i>	0.788	0.7857143	0.571	1.000
<i>DASR-INDONESIA</i>	0.897	0.9285714	0.643	1.000
<i>DASR-MALAYSIA</i>	0.643	0.6428571	0.571	0.929
<i>TASSET</i>	50400000	31300000	5191000	211100000
<i>LEV</i>	0.557	0.595	0.176	0.906
<i>ROA</i>	9.984	5.255	-4.750	47.200
<i>LIQUIDITY</i>	0.830	0.720	0.094	2.389
<i>ECO_GRO</i>	5.439	5.290	4.220	7.420
<i>GDP_CAP</i>	15790.265	10766.350	8433.500	25685.280
<i>INV_GDP</i>	30.034	32.930	23.190	35.070
<i>IND_GDP</i>	40.899	40.050	38.290	43.910
<i>INFLATION</i>	4.017	3.500	1.600	6.400
<i>GOV_EFFECT</i>	0.343	0.010	-0.270	1.120
<i>REGU_QUA</i>	0.168	-0.110	-0.420	0.840
<i>POL_STABLE</i>	-0.262	-0.370	-0.850	0.270
<i>NATURE_GDP</i>	7.087	6.910	3.060	10.950
<i>HDI</i>	0.726	0.691	0.661	0.799

Note: This table displays the descriptive statistics for all variables in this study. The sample comprises 84 firms listed on the Indonesia Stock Exchange (IDX) and Bursa Malaysia for the years 2010-2016

4.2. Pearson Correlation Test

We also conduct the untabulated correlation matrix for all variables used in this study. An external assurance on sustainability report disclosure (DASR) has a positive correlation with Tobins'q (TOBINSQ), with a coefficient of 0.216 and significance at 5%. This value means each disclosure will have the effect of increasing firm value by a proxy Tobins'q (TOBINSQ). The control variables, leverage, return on assets, and liquidity also has a positive correlation with Tobins'q (TOBINSQ) as well. Meanwhile, Firm Size (FSIZE) with Tobins'q (TOBINSQ) has a negative correlation and significance at 1% for $-(0.378)$; this means that companies with larger firm size (FSIZE) have a lower Tobins'q (TOBINSQ).

4.3. Ordinary Least Square Regression Test

This research uses an Ordinary Least Square (OLS) regression model by using STATA 14.0 for regression analysis. In this research, the regression is done twice; the first regression is ordinary least square (OLS), and the second is ordinary least square (OLS) with robust using cluster approach. This method used to strengthen error standard in terms of the regression model, thus making the result relatively constant against any changes in the model. Also, this kind of cluster model is done to resolve the heteroscedasticity problem as our Breusch-Pagan test results show a p-value 0.0000. This value means it has a heteroscedasticity problem in our OLS model. The linear regression model is as follows:

$$TOBINS'Q_{i,t} = \beta_0 + \beta_1 DASR_{i,t} + \beta_2 FSIZE_{i,t} + \beta_3 LEV_{i,t} + \beta_4 ROA_{i,t} + \beta_5 LIQUIDITY_{i,t} + \beta_6 YEAR_{i,t} + \epsilon_{i,t} \quad (3)$$

Table 5. The result of regression table

Variable	Predicted sign	TOBINSQ	
		(1) OLS	(2) Robust Regression
<i>DASR</i>	+	5.862*** (3.92)	5.862*** (2.88)
<i>FSIZE</i>	-	-0.918*** (-3.75)	-0.918*** (-3.51)
<i>LEV</i>	+	3.191** (2.43)	3.191** (2.51)
<i>ROA</i>	+	0.230*** (9.18)	0.230*** (7.35)
<i>LIQUIDITY</i>	+	2.244*** (3.70)	2.244*** (3.32)
<i>CONSTANT</i>		19.675*** (2.91)	19.675*** (3.07)
Year dummies		Included	Included
R-squared		0.898	0.898
F		0.000	0.000
N		84	84
Note: Regression models related external assurance on sustainability report disclosure which is <i>DASR</i> to firm value which is <i>TOBINSQ</i> . The sample comprises 84 firms listed on the Indonesia Stock Exchange (IDX) and Bursa Malaysia from 2010 to 2016. Significance at *10%, **5% and ***1%			

In line with the result shown in Table 5, the coefficient of *DASR* has a statistically positive significance of 5.862 at 1%. The finding indicates that the better the disclosure of a firm in terms of external assurance on sustainability reporting, the higher value the disclosure will get in terms of firm value. Thus, the hypothesis is accepted. As shown in Table 6 column 2 using OLS robust, the finding of the research indicates that the *FSIZE* coefficient belongs to the condition which statistically negative significant at amount – (0.918) at 1%, the result shows that the bigger the size of the firm the lower the value gain, in terms of firm value. The research also found that the *LEV* coefficient belongs to the condition, which has a statistically positive significance of 3.191 at 5%. In other words, an increase in the leverage will affect the firm value as well. Still using the results of Table 6, using OLS robust, the findings show that the *ROA* coefficient is in a condition that has a statistically positive significance of 0.230 at 1%. The results show that a firm with a higher return on assets will have a higher value in terms of firm value. Lastly, using OLS robust, it was found that the *LIQUIDITY* coefficient is in a condition that has a statistically positive significance of 2.244 at 1%. This result means that companies with a higher liquidity ratio have a higher value in terms of firm value.

4.4. Additional Analysis

We also employ various country-level control variables to ensure our result is robust. As shown in table 6, we confirmed that even after we add some country-level control variables, the result is consistent. It still confirmed that our hypothesis is accepted, in which higher disclosure on the external assurance of sustainability reporting results in higher firm value. It can be said that regardless of the country, which in this research context are

Indonesia and Malaysia, our research result is consistent. Similar to our initial regression model, we also employ a cluster approach as Breusch-Pagan tests show a p-value of 0.000.

Table 6. Regression result using country-level variables

Variable	Predicted Sign	TOBINSQ	
		(1)	(2)
		OLS	Robust Regression
DASR	+	6.587** (2.63)	6.587** (2.31)
FSIZE	-	-0.923*** (-3.58)	-0.923*** (-3.20)
LEV	+	3.178** (2.29)	3.178** (2.26)
ROA	+	0.234*** (8.93)	0.234*** (7.37)
LIQUIDITY	+	2.206*** (3.56)	2.206*** (3.19)
ECO_GRO	+	5.256 (0.42)	5.256 (0.48)
GDP_CAP	+	0.006 (0.38)	0.006 (0.43)
INV_GDP	+	4.756 (0.54)	4.756 (0.62)
IND_GDP	+	-3.095 (-0.65)	-3.095 (-0.77)
INFLATION	+	3.169 (0.40)	3.169 (0.45)
GOV_EFFECT	+	31.071 (0.36)	31.071 (0.39)
REGU_QUA	+	-103.963 (-0.47)	-103.963 (-0.53)
POL_STABLE	+	34.938 (0.52)	34.938 (0.58)
NATURE_GDP	+	1.502 (1.40)	1.502 (1.66)
HDI	+	-36.786 (-0.06)	-36.786 (-0.07)
CONSTANT		-102.501 (-0.80)	-102.501 (-0.90)
Year dummies		Included	Included
Country dummies		Included	Included
R-Squared		0.907	0.907
F		0.000	0.000
N		84	84

Note: Regression models related external assurance on sustainability report disclosure which is *DASR* to firm value which is *TOBINSQ*. The sample comprises 84 firms listed on the Indonesia Stock Exchange (IDX) and Bursa Malaysia from 2010 to 2016. Significance at *10%, **5% and ***1%

4.5. Discussion

The hypothesis in this research stated that the higher the disclosure of external assurance on sustainability reporting, the more likely a firm is to have higher firm value. Based on the results of various techniques of analysis carried out, using Pearson correlations and regression results, external assurance on sustainability report disclosure (DASR) and firm value (TOBINSQ) have a positive and significant relationship. Hence, the hypothesis is accepted. The finding of the research shows that such disclosure is a substantial factor for firm value by the proxy of Tobins'q. This result means that higher disclosure of external assurance of sustainability reporting will lead to higher firm value. The results of this study are consistent with research conducted by Clarkson et al. (2013), where the disclosure of voluntary environmental information provided valuation relevant information that could increase the value of the firm. Clarkson et al. (2013) declared that the disclosure of voluntary environmental information is a balanced outcome from the process of selection that improves the calculation of financial performance. However, "to serve this role, once again, they have to be viewed as credible and convey incremental information," that is, to serve concerning its role, the disclosure must be credible in which information is "assured by external professional verification" (Beets & Souther 1999). When companies disclose their external assurance of sustainability reporting, they hope to give an exact figure to the investor, to avoid their performance being misconstrued and miscalculated. Thus, the indication provided by the management is revealed in the assessment of the firm by the investor. At the same time, there is a significant impact for companies in terms of creating a positive corporate image and enhancing corporate prestige which causes the sales improvement, and boosted attractiveness to clients, creditors and officials (Green & Li 2011; Kollman & Prakash 2001; Zhou et al. 2013).

Image and an excellent reputation for the company's performance are some of the considerations of investors to allow them to make investment decisions. Therefore, investors tend to invest in companies that have a good reputation, since nowadays, stakeholders occasionally prefer to choose based on the company's future environmental performance. It is concluded that external assurance of sustainability report disclosure could give a signal to the stock market regarding environmental strategy and commitment to the protection of the environment, which results in additional investment, hence increasing firm value. According to the above explanation, firm value is positively affected by the external assurance of sustainability report disclosure.

5. Conclusion

We demonstrated that variations in sustainability report disclosure with external assurance influence investor perception, which affects firm value. Using two major countries in ASEAN as our sample, this research investigated the relationship between external assurance of sustainability report disclosures and firm value in Indonesian and Malaysian firms for the 2010-2016 period. The purpose of external assurance is to decrease information asymmetry in voluntary disclosure reports. We found that firms in Indonesia present a higher level of disclosure relative to Malaysian firms. We also found that firms with an external assurance of their sustainability report disclosure are valued higher by investors.

We encounter limitations during the conduct of this research. We are aware that this sample research is considered small as only a few firms that publish a sustainability report. Even particular firms publish sustainability reports, but those firms are not guaranteed those following GRI guidelines, which, as a result, we cannot add those firms as our sample to minimize bias in our external assurance on sustainability report disclosure variable. This research's implication is both academic and practical. In academics, this research can be used as fruitful materials for future research that focuses on external assurance on sustainability report disclosure as this research provides new evidence about sustainability assurance on two emerging countries. As for practitioners, it can serve as discussion material in terms of corporate policy planning and implementation in the context of sustainability reports.

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Iman HARYMAWAN is a Assistant Professor in the Department of Accounting, Faculty of Economics and Business, Universitas Airlangga, Indonesia. He obtained his PhD degree (2016) in accounting from City University of Hong Kong in Hong Kong, MBA degree (2009) from National Cheng Kung University in Taiwan, and his B.A. degree (2006) in accounting from Universitas Airlangga in Indonesia. His current research focuses include: corporate governance issues, the accounting impact of political and military connections in business, and financial reporting quality. He currently teaches financial reporting analysis, managerial accounting, and advanced accounting. Research interest: board connection; corporate governance, management accounting

ORCID ID: orcid.org/0000-0001-7621-6252

Mohammad NASIH is the Professor of Department of Accounting, Faculty of Economics and Business, Universitas Airlangga, Indonesia. Currently he is rector of Universitas Airlangga for period 2015 - 2020. He obtained his Doctoral degree (2005) in accounting from Universitas Airlangga in Indonesia, Master degree (1997) in Industry Technology from Institut Teknologi Bandung in indonesia, Bachelor degree (1991) in accounting from Universitas Airlangga in Indonesia. Research interest: islamic accounting; financial accounting

ORCID ID: orcid.org/0000-0002-7945-7593

Atila SALSABILLA is an accounting graduate with background of working in a professional setting as Big-4 auditor, experienced in working as a team and individually under tight schedule with multiple clients. She currently works as internal auditor in PT Kliring Penjaminan Efek Indonesia, one of the Self-Regulatory Organization (SRO) under the supervision of the Indonesia Financial Services Authority (IFSA) that given the authority to make and implement regulations related to its function as LKP in Indonesian capital market. Research interest: corporate social responsibility; auditing

ORCID ID: orcid.org/0000-0003-4641-376X

Fajar Kristanto Gautama PUTRA is master student in accounting from Universitas Airlangga in Indonesia. He obtained his bachelor degree (2018) in accounting from Universitas Airlangga. He currently works as reseach assistant in Center of Politic, Economic, and Business Research (CPEBR), a researcher grup that operates under Faculty of Economics and Business, Universitas Airlangga, Indonesia. Research interest: human resources disclosure; sustainability reporting

ORCID ID: orcid.org/0000-0003-1213-0593



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STUDYING THE IMPACT OF THE DEPRECIATION POLICY ON THE DEVELOPMENT OF INNOVATION POTENTIAL OF INDUSTRIAL ENTERPRISES

Tatyana Yurievna Mazurina ^{1*}, Yana Sergeevna Matkovskaya ², Klavdiya Lazarevna Neopulo ³,
Tatiana Mikhailovna Rogulenko ⁴

^{1,3,4} State University of Management, Ryazanskiy prospect, 99, Moscow, 109542, Russia

² V. A. Trapeznikov Institute of Control Sciences of Russian Academy of Sciences, Profsoyuznaya street, 65, Moscow 117997, Russia

E-mails:^{1*} tatyana_mazurina@list.ru (corresponding author)

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Abstract. The problem of creating a competent depreciation policy is of particular relevance due to the condition of the modern Russian economy, which is in urgent need of the innovation potential development, as well as in the conditions when the dynamics and efficiency of investments in the country and the investment activity of enterprises largely depend on the expansion of internal savings and potential. The current state of the facilities and equipment in the country (basic production assets) is analyzed in this article, along with the dynamics of investments in fixed assets in the GDP reproduction and the structure of sources of their financing. The specifics and advantages of depreciation charges as a source of investments in fixed capital for its modernization are disclosed. This enabled the authors to identify the investment potential of depreciation and to develop a forecast in order to identify the extent of the impact of the depreciation growth on investments in fixed capital in the medium term. The proposals aimed at restoring the reproductive function of depreciation are developed. The theoretical and practical significance of the article lies with justification of the need to restore the reproductive function of depreciation, increase the role of depreciation in investments in fixed capital, and competent implementation and arrangement of the state control over the accrual and use of depreciation in order to develop the innovative potential of industrial enterprises and the economy as a whole.

Keywords: investments; innovation potential; investment sources; depreciation; depreciation charges; depreciation funds; depreciation policy; accelerated depreciation; investment potential of an enterprise

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1. Introduction

The investment crisis, which did not allow to create the basis for innovation-driven growth, was one of the most acute forms of the crisis state manifestation in the Russian economy in the past century and in recent years. As is known, it had negative impact on the innovation and investment potential of the Russian economy and caused its

multiple recession. After more than 25 years since the beginning of the reforms (1992 – 2018), Russia has still not achieved many performance figures of the Soviet period. Some Russian authors describe its depth and systemic nature when covering this problem (e.g. Nikitina et al., 2018). One of the points of view on this problem is "...lagging behind the level of the dying Soviet economy is an indisputable fact of the insufficient investment in fixed capital" (Daskovsky, Kiselev, 2016, p.60).

This describes one of the main problems of the Russian economy: the problem of renewal and growth of fixed capital in the conditions of the high demand for the modernization of physical assets in the country's economy. The situation is aggravated by the decline in access to cheap external funding for large businesses, which was a result of sanctions restrictions. At the same time, the possibilities of debt financing in the domestic market are insufficient due to the limited credit capacity of the banking sector and the underdevelopment of the bond market as a mechanism for raising long-term investments, which is not as developed in Russia as in Western countries. In turn, institutional constraints did not lead to an increase in foreign direct investment.

Internal resources – depreciation funds – should become the most important source of the fixed production assets modernization at Russian enterprises under the current conditions. The preliminary analysis and its results presented in this article indicated that their potential was obviously not being used in full. Meanwhile, the depreciation of fixed assets participates in the formation of not only the residual value of fixed assets, but also the financial performance of enterprises.

Analysis of the impact of depreciation charges as a source of increasing the innovation potential of the Russian economy firstly implies that their systemic significance must be understood, and secondly implies that depreciation charges are not only a source of simple reproduction, but also the most important source of profit generation for organizations. Depreciation of fixed assets has always been and remains one of the important components of the investment process at enterprises, as well as an element of the fiscal policy with respect to profits and assets of organizations.

As such, the main goal of this article is to reveal the role and significance of depreciation charges as an investment source at the macro and micro levels, as well as developing approaches to the formation of a rational depreciation policy of industrial enterprises. The following tasks should be solved to achieve this goal: 1) to analyze the current state of facilities and equipment in the country (basic production assets), dynamics of investments in fixed capital, structure of its financing sources; 2) to reveal the role and advantages of depreciation in investments in fixed capital; 3) to identify the investment potential of depreciation and develop a forecast to identify the extent of the impact of the depreciation growth on investments in fixed assets over a five-year term; and 4) to develop proposals for improving the depreciation policy of enterprises and organizations.

2. Methods

The methodological basis of the article was defined by the use of a set of general scientific and economic methods that enabled to achieve the goal of this article. In particular, the use of the scientific abstraction methods allowed determining the relationship between depreciation policies and the innovation-driven growth of the economy; the method of ascent from the abstract to the concrete and from the concrete to the abstract allowed studying the content of the investment policy and the dynamics of the investment activity in the Russian Federation and was used in developing proposals for improving depreciation policies that had direct impacts on the quality of the innovation potential of Russian enterprises. The methods of analysis and synthesis, generalizations and grouping were used in identifying general trends and features of depreciation policy in Russia, problems of innovation development of the Russian economy, assessing the structure of sources of investments in fixed capital, analyzing and comparing statistical indicators of investment dynamics and their share in GDP, and assessing the state of the basic production assets. The functional analysis was used to study the specifics of the distribution of investments

by types of economic activity and in assessing the state of the basic production assets. The comparative analysis was applied to the implementation of the tasks of cross-country and historically temporary comparison of depreciation policy and its role in the innovation-driven growth of the Russian industry. The statistical analysis methods were applied in calculations in graphic material (tables, figures); the exponential prediction method was used to assess the dynamics and forecast of investments in fixed assets in the Russian Federation from 2011 to 2017 and in the five-year forecast until 2022. Accordingly, the trend analysis method was used when forecasting the total volume of investments and investments in fixed assets through proprietary funds (depreciation). The scenario forecasting method was used in building the scenarios for the depreciation policy development and in developing recommendations on the depreciation policy formation at Russian enterprises.

The methodological base was formed and the categorical framework of this article was based on the works of Karl Marx (1972), A. Marshall (1993), P. Samuelson and W.D. Nordhaus (1999), J. Schumpeter (2001), M. Blaug (2004), as well as S.Yu. Glazyev (2008), V.B. Daskovsky, V.B. Kiselev. (2016), R.M. Nizhegorodtsev (2009), M.M. Sokolova (2014), B.E. Utkina (2014), J. Baltgailis (2019), F. Vigliarolo (2020).

The regulatory legal acts in taxation of profits and property of organizations, as well as in accounting for depreciation charges were used in the article.

The classics of economics have revealed the essence of the object under study in this article and created its theoretical framework, while contemporaries who explore this object have reviewed its applied aspects and conducted a meaningful analysis of the works for this study. V.B. Daskovsky and V.B. Kiselev (2016) should be particularly mentioned, who analyzed the practice of using depreciation charges in the Soviet and post-Soviet periods, paying special attention to the problem of qualifying the costs of overhaul of fixed assets and modernization as investments and to differentiation between the investment and repair investments in their works. Other authors, M.M. Sokolov (2014) and B.E. Utkin (2014), revealed the experience of using accelerated depreciation by many economically developed countries and the Russian economy in order to increase the volume of investments in fixed capital, suggested the necessary measures to improve state regulation of accrual and use of depreciation. S.Yu. Glazyev (2008) explores the most problematic issues in the Russian economy transition to an innovation-driven growth in his works, where the main methodological problem is highlighted, consisting in modeling the economy transition from the inertial (energy source) development path to the innovation-driven one, which implies a qualitative change in the dependencies between the variables of such a scenario model.

For their part, the authors also published several articles related to the object of study in this article. For example, T.Yu. Mazurina (2012) considered the instruments of the depreciation policy at the enterprise in her article, where a net cash flow was proposed as a criterion for the efficiency of the latter, and a number of measures aimed at restoring the economic functions inherent in depreciation were proposed. The problems of the innovation potential development of the Russian economy are considered by Ya.S. Matkovskaya (2014).

Information sources such as the Federal State Statistics Service (Rosstat) and data from reviews of the Analytical Center under the Government of the Russian Federation were used by the authors as an information base.

3. Results

Analysis of the dynamics of investments in fixed assets: trends in the recent decades

It is known that deep depressive changes have taken place in the Russian economy since the 90th of the past century, expressed in a decline in production and investment activity. These processes are described in figures as follows: for example, the volume of industrial production declined by almost half since 1991, and amounted to 51

% in 1999 compared to 1990, while investments in fixed assets decreased five times on average to 22.2 % in 1999 to the level of 1990 (Investments in Russia. 2009).

Meanwhile, according to the formal criteria, which can be directly quantified, both positive and negative changes have taken place in recent years of the new century and influenced the investment processes in the country (Table 1). As can be seen from the table, the dynamics of the main macroeconomic indicators were multidirectional and unstable in 2010 – 2018. As such, the dynamics of GDP and investments in fixed assets from 2010 to 2016 had a negative trend. It must be admitted that a slight acceleration in the growth rates of GDP and investments in the last two years is largely not systemic in nature, since it occurred due to unstable discrete processes. The sectoral sanctions, which extended their influence on the most important sectors of the economy, played a significant negative role, thereby limiting the possibility of investments in basic production assets.

Table 1. Dynamics of investments in the GDP reproduction (in comparable prices, as a percentage of the previous year)

Indicators	2010	2011	2012	2013	2014	2015	2016	2017	2018
Gross domestic product	104.5	104.3	103.5	101.3	100.7	97.5	99.8	101.5	102.3*
Industrial production	107.3	105.0	103.4	100.4	101.7	99.2	102.2	102.1	102.3*
Investments in fixed assets	106.3	110.8	106.8	100.8	98.5	89.9	99.8	104.8	104.3*
Investments in fixed assets as a percentage to 1990 (in comparable prices)	63.9	70.8	75.6	76.2	75.1	67.5	66.9	n/a	n/a
Share of investments in fixed assets in GDP**	20.6	20.7	20.9	21.2	20.8	20.0	21.2	21.5	20.7
Notes:									
*estimated									
**share of investments in fixed assets in 2014 – 2018 was recalculated in March 2019 and incomparable with the data for 2010 – 2013.									

Sources: Russian Statistical Yearbook – 2016; Russian Statistical Yearbook – 2018; Investments in Russia – 2017; Dynamics of investments in fixed assets in the Russian Federation, n. d.; Share of investments in fixed assets in GDP, 2019.

It is clearly demonstrated in the table that there was a negative reversal of the investment growth trend under the influence of sanctions in 2014, which have been in effect for the past three years. The economic downturn of 2015 – 2016 was accompanied by a prolonged contraction of investment activity, which began in the second half of 2014. The decline in investments in fixed assets was 1.5 % in 2014, 10.1 % in 2015, and 0.2 % in 2016, with a decrease in GDP by 2.5 % in 2015 and by 0.2 % in 2016 (Table 1). After the recession, investments in fixed assets in Russia demonstrate a recovery growth: the gross capital formation increased by 4.8 % in 2017 and by 4.3 % in 2018 (Bulletin on the current trends of the Russian economy, 2018). At the same time, the adaptation of the investment process due to the changing structure of investment sources towards the confident predominance of the proprietary sources of business entities should be noted as an important aspect.

However, the investment growth in 2017 and 2018 was largely determined by the comparison base, which was low in 2016 and previous years.

Analysis of the dynamics of investments in fixed assets since 1990 allowed to conclude that their volume had not reached the 1990 level of investments, and it had been reduced by 33.1 % in 2016, as an example. This trend continued in 2017 – 2018, despite the growth of investments in fixed assets compared to the previous year of 104.8 % and 104.3 %, respectively. Overall, the ratio of investments in fixed assets to GDP in Russia decreased from 21.4 % in 2017 to 20.6 % in 2018.

As such, the authors support the opinion of the researchers who talk about the unreasonable use, actual "devouring" of fixed assets, which has been observed in the Russian economy in recent years. According to some estimates, this waste made the country lose a quarter of its total economic potential so far. It becomes obvious that against the background of a decrease in the investment activity, the inflow of investments observed in recent years

does not meet the needs of the morally and physically obsolete assets of the Russian economy either to maintain the existing potential or to its further growth. Moreover, the aging process of fixed assets is progressing, which has negative impact on the efficiency of the economy as a whole.

State of the fixed assets and investment resources in the Russian economy

According to the Decree of the President of the Russian Federation No. 204 dated May 7, 2018 "On the national goals and strategic objectives of the development of the Russian Federation through to 2024", Russia should enter the top five world economies by 2024. This should happen if the macroeconomic stability is maintained, and inflation does not exceed 4 %. The economic breakthrough should be backed by the growth of investments, which should amount to 7.6 % from 2020 and not less than 6 % annually further (Nikolaev, Marchenko, 2018).

Meanwhile, the gross fixed capital formation is an important component of economic growth. At the same time, the task was set long ago to increase the share of investments in fixed assets in GDP to 25 % by 2015 and to 27 % by 2018, according to the Decree of the President of the Russian Federation No. 596 dated May 7, 2012 "On the long-term state economic policy". However, these targets have not been met. It is obvious for many experts that this goal cannot be met due to a number of limiting factors (On the national goals and strategic objectives of the development of the Russian Federation through to 2024, 2018).

As noted above, investments in fixed assets accounted for 21.5 % of the GDP in 2017, and this figure was 20.7 % in 2018.

However, let us turn to the analysis of the state of the productive potential of the economy and its basic production assets before referring to the sources of investment activity in the economy.

The need for an active renovation of production assets is evidenced by the data on the degree of wear of fixed capital in Russian enterprises, as reflected in Figure 1.

For example, the indicator of depreciation of fixed assets reached 48.1 % in the whole economy and 50.0 % in manufacturing in 2016. Similar indicators amounted to 47.3 % and 49.6 %, respectively, in 2017 (the degree of depreciation of fixed assets in the Russian Federation by type of economic activity, n.d.). In turn, the rate of the fixed production assets renewal was 4.3 %, while disposals rate was 0.7 %. It is important that these figures in 1990 were 6.3 % and 2.4 %, respectively (the rates of renewal and disposal of fixed assets in the Russian Federation, n.d.).

The state and dynamics of the wear of fixed assets in the Russian Federation in 2010 – 2017 illustrated in Figure 1 are described by the fact that the level of depreciation of these assets in 2017 approached the level of 2010, while the resulting exponential trend allows predicting that the degree of wear and tear in the course of the year will grow at the current level of its renewal by 2022, which will generally lead to a decrease in the competitiveness of the Russian economy.

The trend analysis of the dynamics of retirement rates and fixed asset upgrades, shown in Figure 2, also illustrates negative trends.

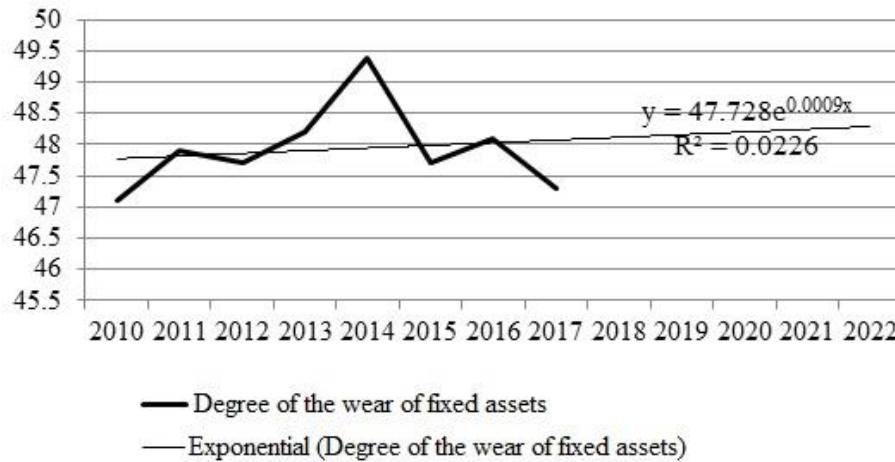


Fig. 1. Dynamics of the wear of fixed assets in the economy in 2010 – 2017 and trend forecast through to 2022 (Investments in Russia, 2017; Russian Statistical Yearbook, 2018; Growth (decrease) rate of the main socioeconomic indicators (cost indicators in comparable prices, 2018; Degree of wear of fixed assets in the Russian Federation by type of economic activity, 2018)

It can be seen from Figure 2 that there is a decrease in the retirement rates and fixed asset upgrades. In turn, the results of forecasting (exponential trend) indicate that the dynamics of these indicators will remain in the same range in the next five years, with a relatively low degree of renewal of fixed assets in the economy, which, respectively, proves the sustainability of the trend of relatively low innovation activity in the Russian economy once again.

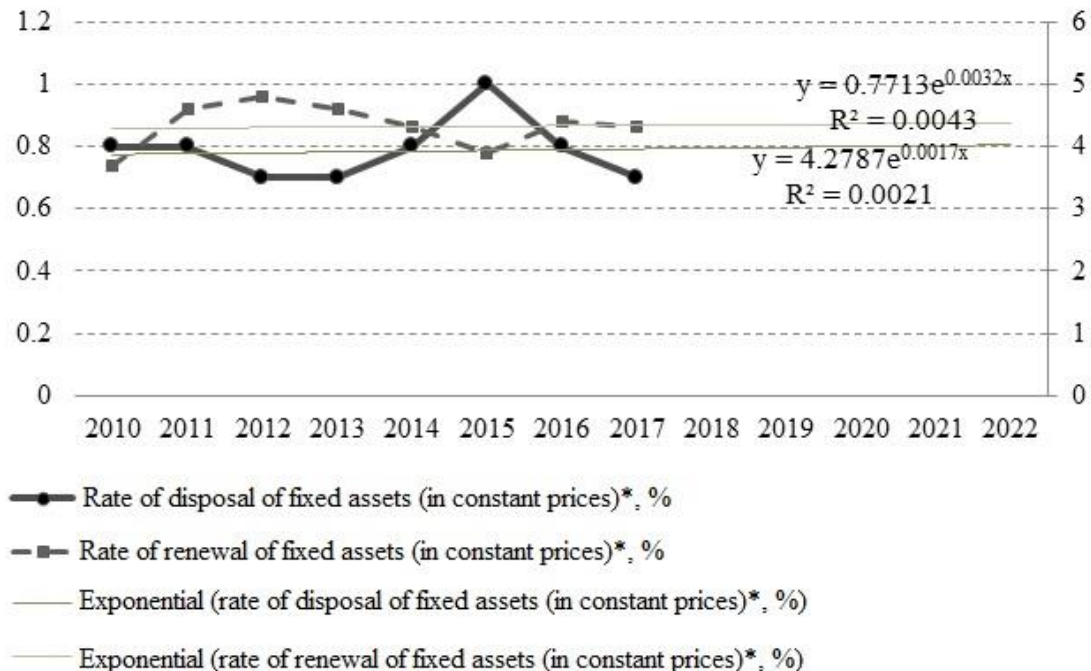


Fig. 2. Dynamics of the retirement rates and fixed asset upgrades (Investments in Russia, 2017; Russian Statistical Yearbook, 2018; Rates of renewal and disposal of fixed assets in the Russian Federation, n. d.).

Meanwhile, during the period of investment decline in the three largest industries (mining, processing, transport), which accounted for more than half of all investments in fixed assets (for large and medium-sized organizations),

the mining sector and transportation maintain positive investment growth rates in annual terms according to 2017 data. Distribution of investments in fixed assets by industries and sectors (excluding small businesses) as of 01.01.2018 is the following: mining accounts for a significant share (24 %), processing industries – for 16.4 %, and transportation and storage – for 18.4 %, while the share of investments in the production of machinery and equipment is only 0.4 %, and in the production of electrical equipment – only 0.2 % from the total investments in fixed assets (Russian Statistical Yearbook, 2018). Besides, there is a clear deformation of the structure of investments in fixed assets towards the passive part of the fixed assets (buildings and structures, residential buildings).

As such, following the results of the crisis, there is a concentration of investment resources mainly in export industries in the Russian economy, with an acute shortage of them in industries focused on the domestic market.

That is why the availability of investment sources is one of the urgent problems in these conditions. This is confirmed by the materials of the sample surveys of the investment activity of organizations conducted in 2018, according to which it was noted that the main investment sources in fixed assets for most organizations in 2018 had been proprietary funds, as well as in previous years. They were used by 80 % of the respondents. Loans and borrowed funds were used by organizations operating in the field of mining other minerals (56 %), providing services in mining (54 %), coal mining (47 %), production of coke and oil products (45 %), iron and steel production (42 %), as well as chemicals and chemical products (40 %). The state funds were used by 29 % of the organizations engaged in mining other minerals and 19 % of the organizations engaged in the collection, purification, and distribution of water (Investment activity of organizations in 2018).

Meanwhile, 60 % of the managers from the surveyed organizations indicated a lack of proprietary funds as a factor limiting their investment activities. 62 % of the heads of organizations indicated high inflation and uncertainty of the economic situation in the country, 58 % of the leaders of organizations surveyed noted investment risks, and a high interest of commercial loans was noted by 54 % (Investment activity of organizations in 2018).

This confirms the need to form an efficient mechanism for mobilizing the internal reserves of organizations once again.

According to the current legislation, the investment activities on the territory of the Russian Federation can be financed by the proprietary (net profit and depreciation) and borrowed sources – for example, bank loans, loans, bonded loans, investors' funds, funds of various budgets, funds of extra-budgetary funds, and funds of foreign investors (Federal Law "On investment activity in the Russian Federation carried out as capital investments" No. 39-FZ dated 25.02.1999).

Of course, the proprietary sources of investment are the most reliable and in some cases preferred. Since they are described by relative simplicity and long-term nature, they secure a stable financial condition of the company and reduce the risk of bankruptcy. Self-financing is the main source of financing investments for enterprises with a high level of technical equipment. Enterprises with an undeveloped technical base lack proprietary funds, and there is a need to raise additional resources. It is extremely difficult to count on state funding, since it is necessary to fulfill a number of stringent conditions.

However, the use of equity as the sole source of financing has its drawbacks for an enterprise: the limited amount of funds available for the expansion of business activities; their higher cost compared to alternative borrowed sources of capital; and unrealizable opportunity to increase the return due to their use, unlike the borrowed funds that generate the effect of financial leverage.

The borrowed funds, including bank loans, increase the financial risks of organizations, but are described by relatively high complexity of their attraction. Unlike a bank loan, the securities market allows raising a fairly large amount of funding for an indefinite period, although there is a problem of the high cost. Unfortunately, such forms of financing as leasing and venture financing are still not widely spread in Russia.

Role of depreciation charges in investments and the investment potential of depreciation

It is commonly known that net profit and depreciation charges are the main proprietary sources of financing investments in any commercial organization. At the same time, depreciation charges are the most important source of financing investments, and successful implementation of investment projects largely depends on it. Meanwhile, international statistics show that "... the share of depreciation in the total investments in developed countries was only 25 – 30 % in the middle of the 20th century, while it stably remains at 70 – 80 % at present. Conversely, the share of profits in total investments decreased from 50 % to 5 – 10 %, and the share of the borrowed funds decreased from 25 – 30 % to 12 – 15 %. Such changes in the structure of sources for financing capital investments efficiently encouraged the economic development. The share of depreciation charges in the total volume of investments in fixed assets in the US was 78.4 % in 2003, 74.2 % in 2010, while in Russia it was about 20 % in 2010 (Utkin, 2014, p. 285).

If we refer to Russia, then "... of the total amount of depreciation charges accrued in 2012 in the amount of 4 trln rub., more than half was spent not on the development but on financial investments: acquisition of securities, provision of loans, and other operations. As a result, the country fell short of 2 trln rub. in investment, which reduced their volume by 13.7 %. Moreover, the state fell short of 400 bln rub. to the state budget on income tax mainly to the regional budgets of the Federation" (Sokolov, 2014, p. 25).

Meanwhile, the efficient consumption of the accumulated depreciation resources opens opportunities to reduce the dependence on external sources of financing for companies and hinders the increase in the "debt load" on the economy, but using this proprietary resource directly will allow modernizing equipment at Russian enterprises and purchasing new equipment, thus increasing their competitiveness (Matkovskaya, 2014).

As such, the main sources of financing today are the proprietary funds of enterprises in the form of net profit and depreciation; state funds (with a declining trend); and bank and commercial lending (Table 2).

Table 2. Structure of the sources of investments in fixed assets, %

Indicators	2010	2011	2012	2013	2014	2015	2016	2017
Investments in fixed assets – total	100	100	100	100	100	100	100	100
of which by sources of financing:								
Proprietary funds	41	41.9	44.5	45.2	45.7	50.2	51.0	51.3
of which:								
profit	17.1*	17.9*	19.5*	18.9*	-	-	-	-
depreciation	20.5*	20.4*	19.6*	22.5*	-	-	-	-
Borrowed funds	59.0	58.1	55.5	54.8	54.3	49.8	49.0	48.7
of which:								
bank loans	9.0	8.6	8.4	10.0	10.6	8.1	10.4	11.2
of which from foreign banks	2.3	1.8	1.2	1.1	2.6	1.7	2.9	5.4
borrowed funds of other organizations	6.1	5.8	6.1	6.2	6.4	6.7	6.0	5.4
investment from abroad	-	-	-	0.8	0.9	1.1	0.8	0.8
budget funds (funds of the consolidated budget)	19.5	19.2	17.9	19.0	17.0	18.3	16.4	16.3
of which:								
funds from the federal budget	10.0	10.1	9.7	10.0	9.0	11.3	9.3	8.5

regional budgets of the Russian Federation	8.2	7.9	7.1	7.5	6.5	5.7	6.0	6.7
local budget funds	-	-	1.1	1.5	1.5	1.3	1.1	1.1
funds of the state extra-budgetary funds	0.3	0.2	0.4	0.3	0.2	0.3	0.2	0.2
funds of organizations and population for shared-equity construction	2.2	2.0	2.7	2.9	3.5	3.2	3.0	3.3
other	21.9	22.3	20.0	15.6	15.7	12.1	12.2	11.5
Note: *Rosstat has not published the data on shares of profit and depreciation in the sources of investments in fixed assets since 2010.								

Sources: Investment in nonfinancial assets, n. d.; Bulletin of the socioeconomic crisis in Russia, 2015

Meanwhile, the borrowed funds amounted to more than 50 % of the total amount of financing investments in fixed assets until 2015. Moreover, their share has steadily declined. Since 2015, the borrowed funds accounted for less than half of the total sources of financing investments in fixed assets. There is a steady downward trend: 49.8 % in 2015, 49 % in 2016, and 48.7 % in 2017. As can be seen from Table 2, the share of budgetary sources in financing investments fluctuates and averages 18 %. At the same time, the dynamics of these sources have been negative in recent years.

Unprofitability of almost one third of organizations on average, out of their total number, limits their investment opportunities to just one source – depreciation funds. Since 2003, the share of depreciation charges in the total volume of sources of financing investments in fixed assets steadily declined: it was 24.2 % in 2003, 20.9 % in 2005, and 17.3 % in 2008. This trend was reversed only in 2009, and the share of depreciation as a source of financing for capital investments increased to 18.7 % (by the end of 2009). As can be seen from Table 2, it further amounted to 20.5 % in 2010, 20.4 % in 2011, 19.6 % in 2012, and 22.5 % in 2013. The share of invested profit increased from 2010 to 2012 from 17.1 % to 19.5 %, after having decreased in 2013 to the level of 18.9 %.

It is obvious that the savings formed in depreciation funds in the Russian Federation are not being sufficiently invested in the creation of new production funds and are mainly used to repair and modernize the fixed assets. The attention in the analysis of these aspects should be drawn to two negative trends. The first is related to the fact that the investment activity and investments in the repair of the existing (sometimes morally obsolete) capacities are equated in the statistical reporting, which, according to many researchers, not only disavows the situation, but also cannot but lead to serious economic consequences. In this regard, the Russian scientists rightly argue that "Overhaul and modernization cannot be considered as forms of the investment activities. The depreciation rate had two components in the Soviet economy: overhaul and renovation of the fixed assets" (Daskovsky, Kiselev, 2016, p.57). The second trend is that the current depreciation rates are actually aimed only at maintaining the existing (sometimes even exploited since the beginning of the industrialization of our country and earlier) fixed assets, which does not contribute to an increase in capital productivity and the production of competitive modern products. What is the real situation in Russia, according to official statistical sources? These data indicate that investments in fixed assets through depreciation charges in 2000 – 2016 averaged slightly less than 20 %, which is clearly not enough (as noted earlier, this indicator stably remains at 70 – 80 % in developed countries) (Utkin, 2014).

Summarizing the above, it can be noted that the issue of moral and physical obsolescence of basic production assets continues to be relevant and unresolved for the modern Russian economy, and its acuteness continues to worsen, while the lack of the efficient mechanisms to solve this problem by developing innovation potential will continue to lead the economy to a serious lag behind the Western economies. The longer it continues, the wider this gap will be. A number of Russian enterprises still need global technical and technological re-equipment, which is increasingly difficult to implement, given a number of current problems caused by both global factors and macro- and microeconomic conditions (including sanctions, insufficient long-term lending, high cost of

resources borrowed on the securities market, etc.). The difficulty of finding sources of financing and servicing their debt in the face of the need to update equipment and resources corresponding to the modern standards of production should encourage the managerial decisions aimed at finding and using internal sources. Depreciation funds, as an internal source of renewal of fixed assets, should resume the performance of their main function. However, this does not happen, as can be seen from Table 2. Moreover, neither depreciation funds nor net income have been reflected in the structure of sources of financing investments in fixed assets in official statistics in the Russian Federation since 2011, which is difficult to explain in terms of the importance of depreciation in the economy.

In order to attract the attention of many researchers to the problems of investment and innovation-driven growth, draw the attention of specialists (scientists and practitioners, experts and auditors, business representatives, and government bodies), and reanimate the theoretical and practical functions of depreciation funds by pointing at the underused investment economy of the depreciation funds potential, the authors of the article first made an attempt to get an answer to the question of how much investments in fixed assets would rise in the following five years and later if their annual increase due to depreciation was 20 % (this level of this indicator was reasonable relative to the trends that had developed over the past years). Secondly, a hypothesis was put forward about the multiplicative effect of depreciation as a source of financing investments on the growth of investments in the fixed assets in the medium term. In this regard, the dynamics of investments in fixed assets in the Russian Federation in the total volume were analyzed for 2011 – 2017, as well as investments in fixed assets through the proprietary funds (depreciation) for the same period. Then the exponential forecast (trend) was built for a five-year period (2018 – 2022) for the above indicators. Finally, scenarios were drawn up to determine the degree of impact of using the depreciation funds (as proprietary funds) on investing in the renewal of basic production assets, taking into account the importance of depreciation funds for indicators of the renewal of basic production assets, as well as their investment potential and basic purpose. This is shown in Figure 4.

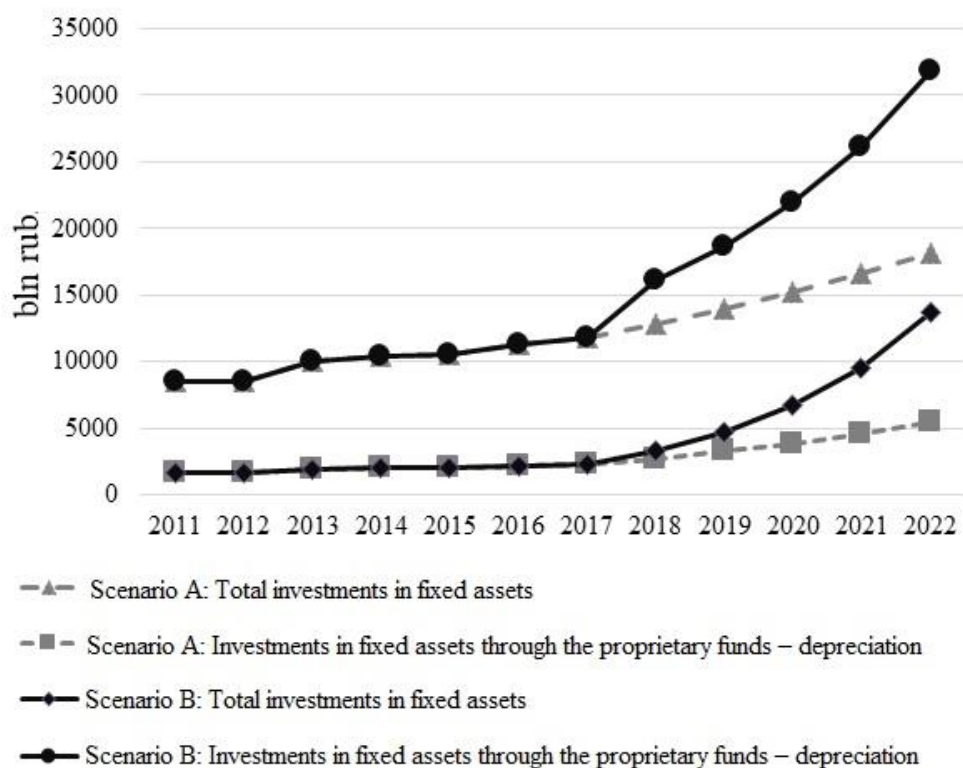


Fig. 4. Dynamics and forecast of investment in fixed capital (scenario forecast) (Growth (decline) rate of the main socioeconomic indicators, 2018; Investment in fixed capital by sources of financing, 2003; Investment in nonfinancial assets, n. d.).

As can be seen from Figure 4, an increase in investments in fixed assets occurred when investments in it through depreciation funds increased – a multiplicative effect of depreciation manifested. The authors used the method of forming scenarios to conduct a situational analysis (Abt et al. 1977). The forecasting period was taken as five years (due to an increase in error when exceeding the five-year lag) – 2018 – 2022 (since no official statistics for 2018 have been submitted at the time of writing the article). It seems reasonable to highlight two scenarios in the final form (Scenario A and Scenario B). If Scenario A is implemented, investments in fixed assets through depreciation charges are made in accordance with the identified growth rate within 19.32 % characteristic for 2005 – 2016, and if Scenario B is implemented, investments in fixed assets through depreciation occur annually with an increase of 20 % (Scenario A + 20 %).

It must be clarified that the main assumptions in forecasting are the following: a) calculations are relevant in 2017 prices; b) since the federal statistical bodies of the Russian Federation have not provided data on the share of depreciation in the structure of financing investments in fixed assets since 2011, and considering the sustained growth of the structural dynamics of investments due to depreciation, the figures for 2011 – 2017 were calculated using chain substitutions; and c) 2010 was taken as the reference year on the basis of calculating the average growth rates of investments in fixed assets through depreciation funds, which seems acceptable as a result of error analysis and mode detection in the respective time series.

As can be seen from Figure 4, a double increase in investments in fixed assets through depreciation leads to significant positive changes in the volume of investments in fixed assets in the economy in general. Meanwhile, an increase in the volume of investments in fixed capital through depreciation funds to a level close to 40 % does not contradict the practice of financing investments in developed countries, while allowing, all other things being equal, to increase the volume of investments in fixed capital by 8,399.7 bln rub. in the scenario forecast presented in this article.

For example, the volume of investments in fixed assets will increase to 6,335.6 bln rub. under scenario A, and up to 20,012.3 bln rub. under scenario B, while the volume of investments in fixed assets through depreciation funds will increase to 3,223.83 bln rub. under scenario A, and up to 11,404.2 bln rub. under scenario B. As such, the absolute increase in fixed capital investment for 2018 – 2022 due to the growth of depreciation as the source of their funding by 8,180 bln rub. will lead to an increase in investments in fixed assets in the economy as a whole by 13,676.7 bln rub., which proves the high efficiency and potential of depreciation funds as a source of investment financing and, all other things being equal, also the multiplier effect created by competent accumulation and consumption of depreciation funds able to significantly increase the innovation potential of the domestic economy and increase its competitiveness.

Conclusions

As such, depreciation is a mechanism that determines not only the investment potential of industrial enterprises and the possibility of their development, but also the economic development of society as a whole, and therefore the depreciation mechanism must correspond to the economic situation prevailing in the country. It should also be remembered that the amount of accrued depreciation can be a full-fledged source of financing only if the cost of the fixed assets used (capital investments made) is high.

In order for the depreciation policy to be a full-fledged dimension of the financial and investment policy of the state and industrial enterprises, the depreciation should regain its inherent economic functions – first of all, by restoring its reproductive function in full (Mazurina, 2012, pp. 22 – 23). The following is required for this:

- to reduce the time of using the equipment based on new technologies;
- to use nonlinear depreciation wider because nonlinear depreciation of objects is in some cases more advantageous than linear one with the current economic parameters. However, the decision on the possible accelerated depreciation of fixed assets for the mobilization of domestic resources should be based on the assessment of the limiting values of the coefficients of acceleration of linear depreciation in the framework of the pricing strategy chosen by the enterprise;
- to create a competitive environment that has direct impact on increasing the interest of organizations in the renewal of fixed assets in order to improve the quality and competitiveness of products and services provided;
- depreciation fund should be considered as a real fund of future capital expenditures; and
- to strengthen the control over the targeted use of depreciation resources, or form a special depreciation fund, which should be used strictly for the intended purpose.

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Tatyana Yurievna MAZURINA

ORCID ID: 0000-0002-8471-4910

Yana Sergeevna MATKOVSKAYA

ORCID ID: 0000-0001-9183-1202

Klavdiya Lazarevna NEOPULO

ORCID ID: 0000-0001-8306-0444

Tatiana Mikhailovna ROGULENKO

ORCID ID: 0000-0001-8593-909x

Register for an ORCID ID:

<https://orcid.org/register>

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EMPLOYEES VERSUS IMPLEMENTING CONTROLLING TO THE BUSINESS PRACTICE*

Mariana Sedliačiková ¹, Zuzna Stroková ², Miloš Hitka ³, Nikoleta Nagyová ⁴

^{1,2,3} Faculty of Wood Sciences and Technology, Technical University in Zvolen, T. G. Masaryka 24, 960 01 Zvolen, Slovakia

E-mails: ¹sedliacikova@tuzvo.sk; ²strokova@tuzvo.sk; ³hitka@tuzvo.sk ⁴nikoleta.nagyova@student.ujs.sk

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Abstract. Implementing controlling into business practice is a difficult, long-term and complex process that is unique for each enterprise. It is affected by various psychological factors that evoke positive and negative emotions by owners, managers and employees. The main objective of this paper is to identify the key psychological factors, emotions and barriers which affect employees during implementing controlling into the business practice. The empirical research of the issue problem was conducted by the questioning method in the form of the questionnaire. In order to evaluate the research results, descriptive, graphical, and mathematic-statistical methods were used. Based on the findings, a concept was proposed which put an emphasis on the key psychological aspects of the employees during the implementation of this tool. The proposed concept could become a support tool for company owners and managers to eliminate negative emotions and evoke positive emotions in employees during the process of implementation and enforcement of controlling into the enterprise, ensuring that controlling is fully functional and accepted by all internal stakeholders.

Keywords: controlling; employees; implementation; psychological factors; emotions, barriers

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1. Introduction

According to Vuko & Ojvan (2013), Todorović-Dudić et al. (2017), Vilčeková et al. (2018) managing the business successfully in a dynamic environment requires an effective controlling system. Controlling is the process of defining objectives, planning and management control so that every decision maker can act in accordance with agreed objectives. Controlling function as a separate department contributes business efficiency through ensuring transparency of business results and business processes.

The term controlling implementation usually means creating an appropriate organizational structure and processes performance organization Kruml & Činčalová (2016). Creating a controlling organization establishes the whole controlling system, constantly growing and open to new requirements of an enterprise Ratanova & Zhukovskaya (2011). When implementing controlling in an enterprise it is needed to consider also the impact of psychological aspects on individual internal groups (Sedliačiková et al. 2015). Sedliačiková (2011), Kruml & Činčalová (2016) and Janská et al. (2017) accent that the barriers arising from controlling implementation must be seen from the point of internal interest groups which are managers, owners and employees of an enterprise. They also say that within the implementation process is needed to perform several activities such as software implementation, assigning duties, competences to individual employees, coordinating controlling duties and activities.

According to Sedliačiková (2018), the psychological aspects of controlling define relationships, feelings, opinions or imagination of people about controlling, and so create baseline and starting point for the building of the real form of this tool. Awareness of these factors enables to make the work of the controller more effective and to understand people's actions and feelings. There are six psychological factors (aspects) for the controllers, managers and employees who receive the information and recommendations that need to be accepted and applied in terms of the effectiveness of implementing and enforcing controlling in the enterprise. These include motivation, communication, feedback, building trust, enforcement and change (Waniczek 2002; Eschenbach 2004; Šatanová et al. 2015; Lorincová et al. 2016; Svec et al. 2018; Horváth & Hollósy, 2019). According to Lee & Raschke (2016), organizations, regardless of industry and size, strive to create a strong and positive relationship with their employees. However, employees have various competing needs that are driven by different motivators (Lorincová et al. 2018; Kubal'a & Vetráková, 2018). For example, some employees are motivated by rewards while others focus on achievement or security. Therefore, it is essential for an organization and its managers to understand what really motivates their employees and if they intend to maximize organizational performance. Effective communication in the workplace is important for the success or failure of an organization. According to Mitrofan & Bulborey (2013) or Fiľa et al. (2015), open communication between subordinates and managers or management and employees contributes to creating and building better interpersonal and professional relationships. This will ensure that employees feel truly valuable and loyal to the company (Kot-Radojewska & Timenko, 2018). It is important that companies support and recognize the achievements of their employees so that they realize the importance of their work, and motivate them to develop their productive activities with more pleasure and greater efficiency (Martinez Martinez & Fernandez Hurtado 2018; Mura & Vlacsekova, 2018; Vlacsekova & Mura, 2017; Olsovska & Svec, 2017; Vydrova, 2018; Szeiner et al., 2018; Vlacsekova, 2019; Bernardi, 2019). Giving and receiving effective feedback are key skills in controlling implementation. Feedback should be constructive, focused on behavior that can be improved. Development of strong professional relationships is a prerequisite for providing/receiving constructive feedback that would act as a powerful motivator (Hardavella et al. 2017). According to Jena et al. (2018), engagement and trust are mutually related to one another, as trust and openness encourage leaders and subordinates to work jointly in order to explore ideas for solving organizational issues while promoting individual's psychological well-being. Taking due care on learning and development of employees and making them realize about organization's concern for their growth and development may result in developing trust. According to Eschenbach (2004) and Jeřábek (2016), enforcement

place an important role in controlling implementation. Its basic part is persuasion, which intentionally promotes own values and attitudes through communication in order to change the values and attitudes of others. Stensaker & Meyer (2011) have argued that experienced employees react more loyally to change, but there is also a risk of more passive reactions. Management needs to be aware of common reactions when employees have been through a multitude of planned changes over time. Change-experienced employees emphasize the procedures through which changes are made (how change is implemented) and activate memories about how previous processes were managed. Management plays a pivotal role in generating positive change process experiences. To successfully implement change initiatives, managers must understand that the role of employees is highly important, and employees' reactions to change are influenced by a number of factors, including employees' emotions and cognitions, communication, and participation in decision making (Wittig 2012). No one is closer to employees who are opposed to change than their direct managers. With regard to resistance, the management, managers and supervisors are in the best position to identify existing resistance and possible causes of its occurrence (Ionescu et al. 2014).

The growing (decreasing) necessity (importance) of controlling leads to an increase in tendency to indicate the positive (negative) emotions that are associated with its implementation and establishment, which manifests in the increasing (decreasing) size of the enterprise, as well as more appropriate (inappropriate) understanding of controlling (Klementová & Sedláčiková 2017). Fear, aversion, disappointment, lack of interest, and uncertainty, belong to the negative emotions evoked by implementing and establishing controlling in an enterprise. Curiosity, happiness, enthusiasm, satisfaction, and motivation are ranked among the positive ones. In the context of organizational change, positive emotions include being confident about change and enhance trust, while negative emotions include feeling stressed or insecure about change, leading to mistrust (Saunders & Thornhill 2004).

The process of change involves emotions, as it is a fact that no one wishes to surrender the comfort associated with the status quo or make concessions on what this person is worth. Despite that, leaders will have to remain successful while being subjected to these challenges, among which are the emotions of those that are affected by the change. Therefore, there is an increase in focus on emotional intelligence in leadership when it comes to managing the process of change (Issah 2018). Leaders with a high level of emotional intelligence can evoke and elicit enthusiasm, excitement and optimism among subordinates, and promote an atmosphere of cooperation, through which they may subsequently develop positive interpersonal relationships with them (Minárová et al. 2015; Edelman & van Knippenberg 2018; Cuellar-Molina et al. 2019). Positive interpersonal relations between the leaders and the subordinates may bring along many benefits to the enterprise (Mura et al., 2019), e.g. the increase in its performance. When leaders understand and are able to influence the feelings of subordinates, they are able to make them reassess the emotions they experience and the ways these emotions are expressed. In general, emotional intelligence includes those skills or abilities related to emotions which underpin the ability of a leader to make major changes in an organization. Neglecting to consider the subordinates' emotional responses to changes may, in fact, result in a declining trend within the enterprise (Jiménez 2018). The main objective of this paper is to identify the key psychological factors, emotions and barriers which affect employees during implementing controlling into the business practice.

2. Material and methods

The research was focused on revealing important psychological factors, emotions and barriers that influence employees during the implementation of controlling into the business practice. Data collection was carried out by means of a questionnaire method in the form of a questionnaire aimed at business entities operating in the Slovak Republic. The content of the first part of the questionnaire was related to the identification questions focused on the size of the enterprise, type of enterprise, duration and legal form of business. The second part of the

questionnaire concerned general questions about controlling, psychological factors, emotions and barriers affecting employees in relation to the implementation of controlling in the company.

Respondents participating in the survey were addressed electronically and by telephone. The sample size was determined using a mathematical relationship to calculate the minimum number of respondents involved in the survey (Kozel et al. 2006):

$$n \geq \frac{(z^2 \times p \times q)}{\Delta^2}$$

The letter n in the formula above presents the minimum number of the respondents; the reliability coefficient is the quantity z; quantities p and q demonstrate the percentage of respondents who know or do not know about the given issue, or are inclined to one or other variant. Since the selection of respondents was purely random and their knowledge in the field of controlling was not known, it was necessary to divide the sample of respondents in half so that the product of p and q values would be maximal, i.e. 50% to 50%. The quantity Δ presents a value that means the maximum acceptable significant error (Kozel et al. 2006).

For higher reliability of the research (95.4%), the value of the quantity was determined as z=2. The maximum error value for a representative sample was set at 5%. By substituting the individual values into the formula, the minimum number of respondents was determined for the reliability of the research (Kozel et al. 2006):

$$n = \frac{2^2 \times 0,5 \times 0,5}{0,05^2}$$

In order to make the research reliable, the questioned sample should consist of at least 396 respondents. Out of the total number of 1.620 respondents, 471 participated in the questionnaire survey, which represents 29.07% of all respondents in terms of percentage. A more detailed structure of the research sample is given in table 1.

Table 1. Structure of the research sample

Data to identify respondents	Relative frequency
Size of enterprise	
Micro enterprise (0-9 employees)	61%
Small enterprise (10-49 employees)	34%
Medium enterprise (50-249 employees)	3%
Large enterprise (more than 250 zamestnancov)	2%
Type of enterprise	
Production	52%
Non-production	48%
Duration of operation on the market	
Less than 1 year	13%
Less than 5 years	21%
Less than 15 years	26%
More than 15 years	40%
Legal form of the undertaking	
Limited company	44%
Joint stock company	24%
Self-employed person	21%
Others	11%

Source: Own research

The results of the research were processed using the Statistics 10 software. The Friedman and Wilcoxon signed-rank test was used to test the following three hypotheses at a significance level of $\alpha = 0.05$:

H1: It is assumed that feedback and building trust are factors that according to the employees, influence the most the implementation and application of controlling into an enterprise.

H2: It is assumed that excessive control over the employees is the most significant barrier at the implementation of controlling into an enterprise.

H3: It is assumed that the feeling of motivation is the most frequent feeling of the employees evoked by the implementation of controlling into an enterprise.

The Friedman and Wilcoxon test is a non-parametric test, typical for simple and easy application. Non-parametric methods are based on frequencies (e.g. median test) or rankings, assigned to the original data (Rimarčík 2007). Friedman test is applied in the case, when for the subjects n , we follow the certain character in $k \geq 3$ different situations, in k different conditions or k different periods (Pacáková et al. 2015). Wilcoxon test can be applied in situations when the data are not normally distributed or do not have a quantitative character (Kvasnička 2012).

3. Results and discussion

Approximately 49% of the surveyed employees stated that they work in companies without implemented controlling, 31% of employees work in companies planning to implement this comprehensive management system, and 14% in enterprises with implemented controlling. The remaining 6% were employees who could not clearly answer the question.

Employees (76%) consider informing about changes to be a key activity that would precede the implementation of controlling. A relatively high percentage was represented by training and course activities (61%) and assessment of employees' skills (56%). Employees consider the labor market survey to be the least significant activity in order to attract a professional - specialist (32%) who would ensure the entire process of controlling implementation.

Employees consider the gradual implementation of controlling within individual departments of the company as the most effective way of implementation. A gradual implementation within the individual operational unit and from top management downwards is considered as equally effective option. They consider less effective to implement controlling in the whole enterprise at once and the least effective to implement it from a lower organizational unit to top management.

Employees had a choice of six psychological factors that they assessed on the scale of 1 (very large influence) to 5 (I don't know). From Fig. 1 results that the employees consider feedback to be the psychological factor that most influences the implementation and application of controlling into an enterprise. Building trust is seen by employees as another important factor. Respondents could not express themselves clearly about factors such as implementation method, change and cooperation. The graphical evaluation of the question is related to the subsequent evaluation of the hypothesis H1.

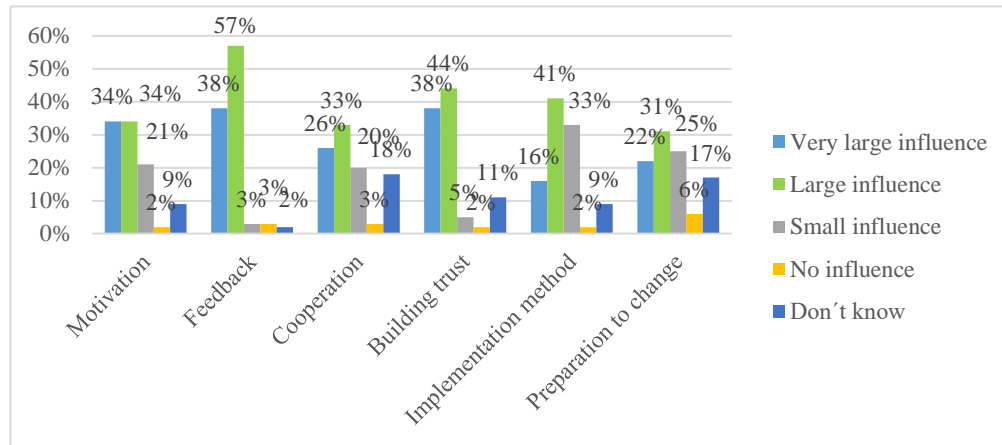


Fig.1. Influence of psychological factors on the implementation of controlling in %

Source: Own research

Based on the results presented in Table 2, it can be concluded that the psychological factors are not equally significant ($p < 0.05$). Using the Wilcoxon test, the order of Friedman test values has been determined. Building trust and feedback are psychological factors that mostly influence the implementation of controlling in an enterprise. The opposite tendency has been confirmed for the implementation method and preparation to change. Based on these results, *the hypothesis H1 has been confirmed, i.e. assumption that feedback and building trust are factors that according to the employees, influence the most the implementation and application of controlling into an enterprise.*

Table 2. Friedman a Wilcoxon test of hypothesis H1

Friedmanov test		Wilcoxonov test					
N	103	Psychological factors	PF1-PF2	PF3-PF2	PF4-PF3	PF5-PF4	PF6-PF5
Chi-Square	39,528	Z	-,101 ^b	-2,818 ^b	-,871 ^b	-2,181 ^b	-,541 ^b
Df	5	Asymp. Sig. (2-tailed)	,919	,005	,384	,029	,588
Asymp. Sig.	,000	a. Wilcoxonov Signed Ranks Test b. Based on positive ranks. c. Based on negative ranks.					

Source: Own research

Notice: PF1-motivation, PF2-feedback, PF3-cooperation, PF4-building trust, PF5-implementation method, PF6-preparation to change

The questioned employees consider excessive control as the most important barrier to implementation of controlling in the company. They are afraid to lose their current job position, the relationships on the workplace would change and they would need further education after the implementation of the comprehensive management system. The employees consider the inability to carry out new activities as the least significant barrier. Despite the concerns of further education, they are not afraid of possible competition. The graphical evaluation of the importance of barriers in the implementation of controlling in the enterprise is related to the evaluation of the hypothesis H2 (table 2).

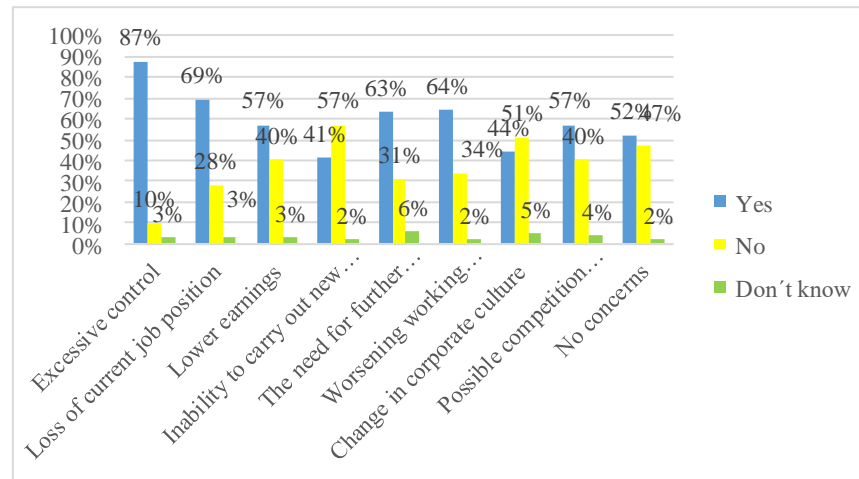


Fig.2. Influence of barriers on implementation of controlling in %

Source: Own research

The evaluation using the Friedman test in Table 3 revealed that not all options were equally significant ($p < 0.05$). Subsequent use of the Wilcoxon test confirmed that the p value is lower (0.000) than the selected significance level $\alpha = 0.05$. Based on this, *the hypothesis H2 has been confirmed, i. e. the assumption that excessive control over the employees is the most significant barrier at the implementation of controlling into an enterprise.*

Table 3. Friedman a Wilcoxon test of hypothesis H2

Friedmanov test		Wilcoxonov test				
N	148	Barriers	B1-B2	B3-B1	B4-B3	B5-B4
Chi-Square	101,447	Z	-4,648 ^b	-,906 ^b	-,216 ^d	-1,444 ^b
Df	8	Asymp. Sig. (2-tailed)	,000	,365	,829	,149
Asymp. Sig.	,000		B6-B5	B7-B6	B8-B7	B9-B8
		Z	-,216 ^b	-1,325 ^b	-1,166 ^b	-,990 ^b
		Asymp. Sig. (2-tailed)	,829	,185	,244	,322
a. Wilcoxon Signed Ranks Test						
b. Based on negative ranks.						
c. Based on 10000 sampled tables with starting seed 562334227.						
d. Based on positive ranks.						

Source: Own research

Notice: B1-excessive control, B2-loss of current job position, B3-lower earnings, B4-inability to carry out new activities, B5-the need for further education, B6-worsening working relationships, B7-change in corporate culture, B8-possible competition (new employees), B9-no concerns

As presented in Fig. 3, the implementation of controlling into an enterprise raises mainly the feelings of fear, motivation and uncertainty. In relation to the change of management, the employees expect the introduction of a new motivation system. The feelings such as fear and uncertainty result mostly from the lack of knowledge and information about the new management system. The employees may also feel concerns to lose their current job position or necessity of further education with the objective to increase their performance. Happiness, enthusiasm and resistance are less important feelings. The graphical evaluation of the significance of barriers is linked to the statistical evaluation of the hypothesis H3.

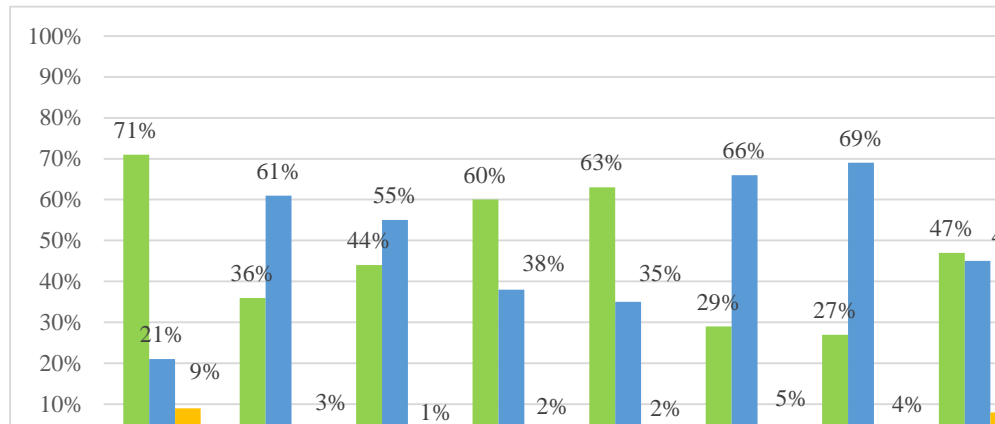


Fig.3. Influence of emotions on implementation of control in %

Source: Own research

The application of the Friedman test has proven (Table 4) that the combinations are not equally significant ($p < 0.05$). Wilcoxon test has consequently determined the ranking of importance of individual combinations. Based on the evaluation we can state that *motivation is the most frequent feeling of the employees evoked by the implementation of controlling into an enterprise. Therefore, the hypothesis H3 has been confirmed.*

Table 4. Friedman and Wilcoxon test of hypothesis H3

Friedmanov test		Wilcoxonov test					
N	144	Emotions	E1-E2	E3-E1	E4-E3	E5-E4	E6-E5
Chi-Square	206,967	Z	-4,093 ^b	-,465 ^b	-,808 ^b	-,843 ^b	-1,941 ^b
Df	9	Asymp. Sig. (2-tailed)	,000	,642	,419	,399	,052
Asymp. Sig.	,000		E7-E6	E8-E7	E9-E8	E10-E9	
		Z	-1,410 ^b	-1,238 ^b	-1,698 ^b	-,679 ^b	
		Asymp. Sig. (2-tailed)		,216	,090	,497	
a. Wilcoxon Signed Ranks Test							
b. Based on negative ranks.							
c. Based on 10000 sampled tables with starting seed 1660843777.							

Source: Own research

Notice: E1-fear and concern, E2-resistance, E3-dissappointment, E4-lack of interest, E5-curiosity, E6-enthusiasm, E7-hapiness, E8-satisfaction, E9-motivation, E10-uncertainty

A thorough analysis of the results of the empirical survey has resulted in the design of a concept of key psychological factors, emotions and barriers that influence employees at the implementation of controlling into the business practice (Fig.5). The concept takes into account mental health, well-being and requirements of the employees. Psychological factors are in the center, influenced by surrounding factors. Employees consider feedback and trust building as the most important psychological factors to take into consideration when implementing controlling into an enterprise. The motivation was also rated with a relatively high percentage (Fig.4). The excessive control of employees is the most important barrier to this system. This concern is to some extent justified and predictable. In connection with this organizational change, employees may experience a lack of freedom, which may result in conflicts and misunderstandings in the workplace. They may feel afraid of losing their current job position due to lack of skills or knowledge. These concerns can be prevented by timely and correct informing employees about the planned changes. A positive aspect of the concept is that controlling

evokes a sense of motivation. This is related to the fact that the implementation of controlling also brings a change in the motivation system so that employees expect a fairer assessment of their performance. The implementation of this system may cause the feelings of fear, concerns and uncertainty, however, this is considered justified. Many employees are not familiar with the concept of controlling and are unaware of its effect on business activities. Correct and timely communication is an indispensable tool to overcome all possible misunderstandings and conflicts and establish successful cooperation between all interested parties. Schalk et al. (1998), King & King (2016), Hasanaj & Manxhari (2017), Šafránková & Šikýř (2017), Tavakoli (2010) agree with this idea and emphasize that the basic idea of positive organizational change is that if employees are perceived seriously and with respect, they will flourish and their efforts will focus on the success of the planned changes. Managers who understand the psychological aspects of changes can better plan what methods to use, when and how to use them, and under what specific conditions they can lead to more positive results. Looking for creative ways to implement changes that inspire positive emotions and responses is a useful challenge for managers. Giaefer & Smollan (2015) confirm that feedback from employees is essential to assess the level of acceptance and emotional reactions that could help or hinder the change. According to Mangundjaya et al. (2015), managers should make sure that the satisfaction of employees prevails before the change itself, in an effort to evoke their positive responses in readiness and commitment to change.

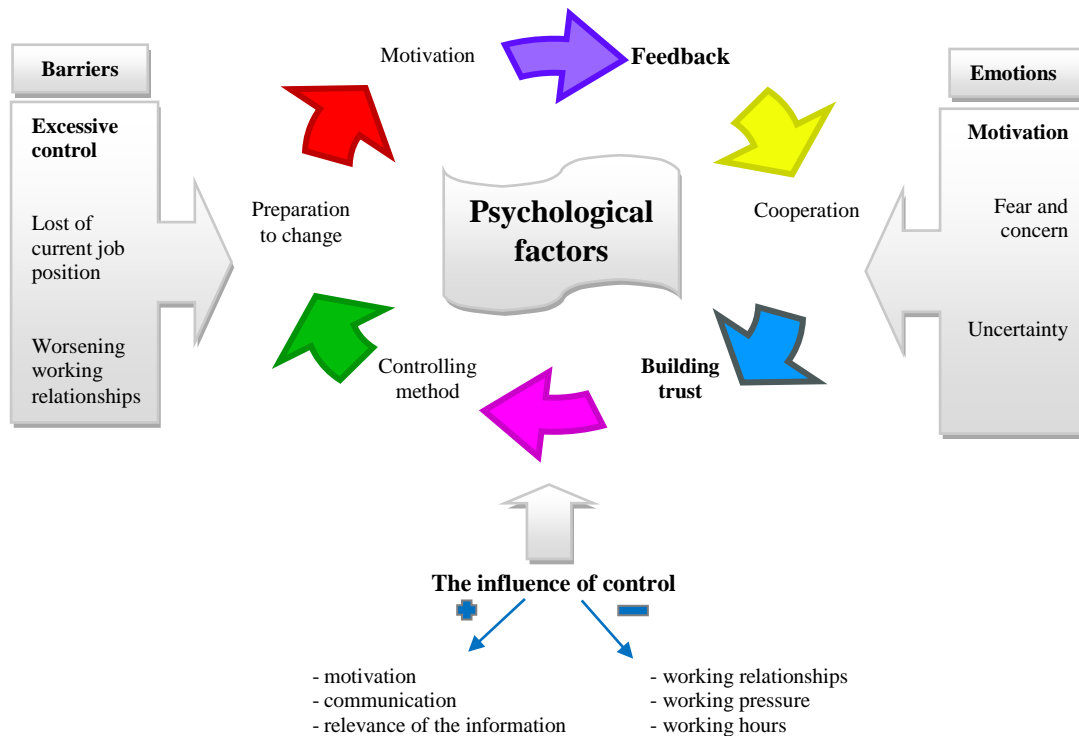


Fig.5. Key psychological factors, feelings and barriers influencing employees at implementation of controlling into an enterprise

Source: Own research

Bernstrøm & Welds (2017) emphasize that a sense of trust is important for understanding important mechanisms in the workplace. Introducing monitoring systems and excessive control over important work tasks can signal a lack of management confidence, leaving employees demotivated and with a reduced sense of mastery. According to Čambalíková & Mišún (2017), command-and-control techniques are no longer enough in competitive environments where creativity and employee initiative are critical to business success. Their research has shown that the respondents with a negative attitude, while they are being controlled, mentioned the lack of trust, lack of

information, poor cooperation and great time consumption. Respondents who have a neutral attitude while they are being controlled understand the need for control and they take it as a natural part of processes. Proper control can have a positive effect and improve the state of things and they can also get some feedback to learn by their own mistakes. Respondents with a positive attitude to the control declared that it can help them to achieve the goals and plans, to increase the sense of responsibility and motivation and it can be beneficial to their professional growth. According to Verburg et al. (2017), controls may enhance employee performance both directly and through enhanced trust. This suggests that the link between control systems and trust is sensitive and related to the way in which behavior is controlled. Heuvel & Schalk (2009), Heuvel et al. (2015) confirm that by maintaining good psychological contracts with employees, enterprises can build trust that could prevent resistance to changes.

Conclusions

The issue of controlling and psychological factors affecting employees in its implementation into business practice is a relatively extensive and topical subject. Each change is created to improve the performance of an organization. Changes generate a wide range of effects and feelings in employees. On the one hand, they are afraid of excessive control as a result of the implementation of a new management tool, but on the other, they feel motivated to improve and increase their performance in a work environment where trust and respect prevail and commitment is rewarded with positive feedback from their direct supervisors. Thus, the success of implementation and management of changes depends mainly on the perception of the employees, while their reactions to changes differ due to personal experience, levels of motivation, socio-demographic characteristics, knowledge, values and behavioral models (Furxhi et al. 2016; Magano & Thomas 2017). It is essential to perceive controlling not only in terms of its economic but also psychological aspects. By combining these two areas, it is possible to create favorable conditions for successful implementation of this tool into business practice and its acceptance by internal interest groups.

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Mariana SEDLIAČIKOVÁ is the Associate Professor at Faculty of Wood Science and Technology, Technical University in Zvolen, Zvolen, Slovakia. V roku 2014 bola ocenená Úradom pre normalizáciu, metrológiu a skúšobníctvo cenou za najlepší publicistický prínos v oblasti kvality práce, produkcie a života. Research interests: controlling; finance, financial management; small and medium enterprises; economies in wood-processing enterprises.

ORCID ID: orcid.org/0000-0002-4460-2818

Zuzana STROKOVÁ is an Assistant Professor at Faculty of Wood Science and Technology, Technical University in Zvolen, Zvolen, Slovakia. She deals with the issue of Funding and Financial Management of small and medium sized enterprises.

ORCID ID: orcid.org/0000-0002-6800-5321

Miloš HITKA is an Associate Professor at Faculty of Wood Science and Technology, Technical University in Zvolen, Zvolen, Slovakia. His research interests are in the area of Human Resources Management. He is a Member of Editorial Boards for International Data Bases indexed Journals and the Organizing Committee of International Conferences. He is the author of many articles published in database CCC, Web of Science and SCOPUS.

ORCID ID: orcid.org/0000-0002-6567-7333

Nikoleta NAGYOVÁ is an Assistant Professor at Faculty of Economics, J. Selye University, Komárno, Slovakia. She deals with the issue of Motivation, Human Resource Management and Marketing of organisations.

ORCID ID: orcid.org/0000-0001-9495-5382

Register for an ORCID ID:

<https://orcid.org/register>

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SUSTAINABLE ECONOMY: EVALUATION OF FOOD SELF-SUFFICIENCY IN RUSSIA^{*}

Veronika Yu. Chernova¹, Alexander M. Zobov², Ekaterina A. Degtereva³, Vasily S. Starostin⁴,
Inna V. Andronova⁵

^{1,2,3,5} Peoples' Friendship University of Russia, 6, Miklukho-Maklaya Str., Moscow, 117198, Russian Federation

^{1,4} State University of Management, 99, Ryazanskiy prospect st., Moscow, 109542, Russian Federation

E-mails: ¹ veronika.urievna@mail.ru ; ² a_zobov@mail.ru ; ³ degseb@mail.ru ; ⁴ vs_starostin@guu.ru ; ⁵ Alv1207@mail.ru

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Abstract. The level of food self-sufficiency is a relevant aspect of food security. The paper studies food self-sufficiency in the context of economic and physical availability of food. It develops an approach to assessing the level of food self-sufficiency which includes a number of indicators, such as international trade, food consumption standards and diversification of food imports. Empirical testing of the approach is performed within the agricultural sector of Russia for 2012–2018, where import substitution policy is being actively implemented. The research results demonstrate that in Russia only three food groups are self-sufficient, whereas all other categories are characterized by extremely low self-sufficiency levels. Having compared the self-sufficiency levels, the authors discover a discrepancy between the assessment method applied by the Russian Federal State Statistics Service (Rosstat) and that proposed in the paper; the difference between the two methods can reach up to 40%. The study indicates that there is a decrease in diversification of imports, which poses the risk of undersupply of foodstuffs. The research finds that the domestic production of grains exceeds the rational consumption norms, which results in the excessive consumption of this type of food, if compared to the recommended standards. At the same time, self-sufficiency in dairy products and vegetables is low and self-sufficiency in fruits is extremely low. The article concludes that Russia's Food Security Doctrine is focused on production, but not consumer, which necessitates its assessment indicators to be revised.

Keywords: food self-sufficiency; food; food security; diversification of import; food availability; rational consumption norms

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1. Introduction

Agro-industrial policy of all countries is premised on the concept of food security. The original approaches to food security concentrated on stockpiling (Report of the World Food Conference, 1974), which indicates the physical availability of food. Later, insufficient purchasing power of a part of population became a threat to food security, which caused the parameter of economic availability to be included in the food security evaluation. Nowadays, the issues of health, the amount of nutrients in food and the quality of foods are widely debated (Ecker & Breisinger, 2012). The three aspects – physical/economic availability, safety and quality of food – as well as their stability over time, appear in the most commonly used definitions of food security (FAO, 2001).

A high level of self-sufficiency is a prerequisite for food security. The issues of self-sufficiency have gained in popularity after the global financial crisis of 2007–2008. A range of countries, such as India, Qatar, Philippines, Senegal, Bolivia, etc. shifted their policies towards enhancing food self-sufficiency. This provoked considerable discussions among scientists (Clapp, 2017; Moumen et al., 2019). The supporters of the food self-sufficiency policy argue that every country has the right to protect itself from crises in global food markets by increasing domestic food production. According to the opponents of the food self-sufficiency policy, reducing imports and increasing domestic production are more of a political goal than an economic one. Growing self-sufficiency in foods will result not only in an increase in the foodstuffs cost of the country that pursues that policy (due to the absence or shortage of natural or other resources for production (Todorov et al., 2018)), but will also have disastrous consequences for the whole world (Financial Times, 2009).

In this context, there are two main types of decisions in the field of agro-industrial policy aimed at ensuring food security, namely domestic production and import. The situation where a country is fully self-sufficient in domestic products and, therefore, does not participate in world food trade is extremely rare, and represents more of a theoretical abstraction. All countries, including large food exporters, to a certain extent rely on import, at least for some food groups. Participation in the international division of labor provides plenty of opportunities to resolve food problems in the most efficient manner. At the same time, increased protectionism in the agri-food sector inevitably leads to a rise in prices. The measures causing food prices to grow decrease their affordability for population, and this undermines food security of a country (Zagashvili, 2015).

Import substitution policy implemented in some countries including Russia is a prototype of the autarchy mechanism, the purpose of which is to limit food imports while concentrating on domestic food production. The assessments of the effectiveness of import substitution policy are ambiguous. Therefore, we look at the concept of food self-sufficiency from the perspective of system-based and balanced approaches. On this basis, we propose a method for evaluating food self-sufficiency and prove that, despite the import substitution policy actively enforced in Russia over the last few years, not all food categories are self-sufficient.

2. Literature Review

The problems associated with sufficiency and availability of food in various countries are addressed in burgeoning literature on the topic. Many researchers emphasize that, despite growing production volumes and food supplies, the problem of ensuring food security is relevant for all countries (Baer-Nawrocka & Sadowski, 2019). In literature, food security is mostly interpreted as independence and ability to maintain self-sufficiency exclusively by producing domestic food amid full or partial isolation (Zagashvili, 2015).

According to the Food and Agriculture Organization (FAO, 1999), food self-sufficiency is defined as the extent to which a country can satisfy its food needs from its own domestic production. The situation, where food production is equal to food consumption, corresponds to 100% self-sufficiency. In other words, self-sufficiency in food suggests that a country produces as much food as is sufficient to fully satisfy its population's needs. The

given definition leaves open the question of the country's participation in international trade, the influence of this participation on self-sufficiency and the choice of policy on the agricultural sector regulation.

Botkin, Sutygina, and Sutygin (2016) note that the leading world economies maintain a high level of self-sufficiency: the USA and France – 100%, Germany – 93%. Since 2014, Russia has been actively pursuing import substitution policy aimed at achieving a high level of food independence. Russia's Food Security Doctrine stipulates the threshold values for food independence indicators for food staples: grain and potato (no less than 95%); milk and dairy products (no less than 90%); meat and meat products, salt (no less than 85%); and sugar, vegetable oil and fish (no less than 80%). It is worth mentioning that the approach to assessing self-sufficiency exercised in Russia differs significantly from those employed worldwide.

A number of publications (see, for example, (Kopein, 2016; Pozhidaeva, 2017)) examine food availability and food security from the standpoint of import substitution policy. In particular, Ayapova (2017) highlights that food security is affected by not only the current state of the agricultural market in Russia, but also by the import substitution policy underway that is characterized by an increased level of protectionism, as well as the overall economic situation in the country. Russia's Food Security Doctrine views self-sufficiency as sustainable domestic food production that meets the established threshold values of its specific weight in the commodity resources of the domestic market of the corresponding products (Decree of the RF President, 2010). At the same time, the Doctrine stresses the need to achieve the physical and economic availability of food for every citizen in volumes no less than rational consumption norms. This results in the fact that there are diverse and ambiguous interpretations of the term "food self-sufficiency" (Botkin et al., 2016).

Kuzmin (2015; 2016) focuses on defined specifics of a price factors' influence on market balance. The subsequent development of ideas on dynamic security has led to a defined "floating" balance, when the market due to its movement inertia crosses an equilibrium point, from a condition of relative deficit to an account surplus of supply and demand, and vice versa.

Zagashvili (2015) emphasizes the ambiguous interpretation of the concepts of food security, food independence and self-sufficiency. Zagashvili claims that food security is not synonymous with food independence and is ensured by a set of measures that, in addition to the development of domestic food production, involves participation in international trade.

According to the Rosstat method, the level of self-sufficiency is calculated on the basis of the food balance sheet and shows the extent to which a country relies on its own production resources to satisfy the population's need for foods. In general, self-sufficiency ratio (SSR) is defined as:

$$SSR = \frac{DP}{DC}, \quad (1)$$

where DP is the volume of domestic production; DC is the volume of domestic consumption.

The level of self-sufficiency can be also calculated on the basis of food supply available for domestic utilization (DS):

$$SSR = \frac{DP}{DS}. \quad (2)$$

At that, the volume of food available for consumption, or supply, is calculated as follows (FAO, 2019): (a) supply = production + imports + decrease in stocks; (b) supply = production + imports + changes in stocks (decrease or increase); (c) supply = production + imports – exports + changes in stocks (decrease or increase).

While not denying the significance of international trade for economy, a number of researchers still analyze self-sufficiency in the absence of exports and imports. For instance, Tribushinina and Kurkina (2014) and Pozhidaeva (2011) interpret (regional) food self-sufficiency as an economic situation where a region's food resources are sufficient and there is no need to import foods from other regions. In this case, the level of self-sufficiency is calculated as a ratio of domestic production of foods from a particular category to demand for them (Tribushinina & Kurkina, 2014; Pozhidaeva, 2011):

$$SSR = \frac{P}{PC + PCF + F_L}, \quad (3)$$

where P denotes production of foods from a particular category per year; PC is productive consumption; F_L is loss of foods from a particular category; PCF denotes personal consumption fund.

Mansurov (2017) proposes another way for calculating self-sufficiency, where SSR is defined as a difference between normative food provision based on recommended consumption norms and actual self-sufficiency. The approach suffers from a number of disadvantages, the most significant of which is neglecting imports and exports of foods when evaluating self-sufficiency.

Numerous research studies criticize the existing approaches to assessing food self-sufficiency. Zagashvili (2015) notes that Russia's Food Security Doctrine concentrates solely on manufactured products and does not pay attention to the entire producer-to-consumer supply chain of agri-food products. According to FAO's latest estimates (FAO, 2019a), about 30% of all food produced globally are lost in the supply chain between the producer and the market. Hence, not all manufactured food is available for consumption, and the issue of reducing food loss along the entire chain of agri-food production has become increasingly urgent (Popova, Vlasov & Nikitina, 2018; Fomina, Berduygina & Shatsky, 2018).

Thus, the literature review indicates that, despite the high relevance of sufficiency and availability of foods in Russia, the issues of food self-sufficiency have not yet been adequately investigated and the methodological approaches to assessing its level have a number of drawbacks that distort the real situation.

3. Methods

To assess the level of food self-sufficiency, the present study develops an approach based on the following indicators: the level of self-sufficiency adjusted for international trade; the level of self-sufficiency in normative consumption, and the level of self-sufficiency according to the Rosstat method.

1. Assessing the level of self-sufficiency adjusted for international trade.

The authors define food self-sufficiency as the level of domestic production in the total volume of food products available for consumption. We use the formula for self-sufficiency ratio that is calculated as a ratio of domestic food production to domestic food consumption (FAO, 2012):

$$SSR_c = \frac{DP}{DP + I - E + \Delta S}, \quad (4)$$

where DP is domestic production; I is imports; E is exports; ΔS is changes in food stocks.

A high level of losses proves that processing, transportation and storage of foods are inefficient, which directly affects the volume of foods available for domestic consumption. Due to the fact that in Russia food losses in different periods reached up to 13% (Rosstat, 2019a), the given formula needs to be adjusted for the amount of losses (L):

$$SSR_c = \frac{(DP - L) \cdot 100\%}{DC}, \quad (5)$$

where DC is domestic consumption for production-related and personal goals adjusted for international trade, food losses and changes in stocks calculated by formula:

$$DC = (DP - L) + I - E + \Delta S. \quad (6)$$

Domestic production, imports, exports and stocks can be measured using the metric system (thousand tonnes, thousand pieces), in monetary terms or in calories. In contrast to the self-sufficiency indicator used in the Rosstat method, this approach demonstrates the share of domestic production not in commodity resources, but in supply of food available for consumption.

Self-sufficiency ratio is calculated for an individual product or product group. FAO does not recommend applying SSR to the overall food situation in a country, since it can disguise the cases where the country is abundant in a certain product, but is forced to import other foods (FAO, 2012).

2. *The assessment of self-sufficiency using the Rosstat method takes the following form:*

$$SSR_R = \frac{DP \times 100\%}{DC_I}, \quad (7)$$

where DC_I is domestic consumption that combines productive consumption (DC_{PC}), consumption for personal purposes (DC_{Per}), processing for food purposes (DC_{FP}) and losses (L):

$$DC_I = DC_{PC} + DC_{Per} + DC_{FP} + L. \quad (8)$$

Currently, when calculating self-sufficiency, losses are considered as part of domestic consumption, which is correct from the standpoint of production, but not consumers. As follows from the definition, losses are a part of output which is not received by consumers. Following this logic, we exclude losses from the volume of products consumed:

$$SSR_{RL} = \frac{(DP - L) \times 100\%}{DC_I}. \quad (9)$$

The proposed approach eliminates the shortcomings of the Rosstat method for assessing self-sufficiency by the share of domestic production in resources. However, it does not allow for recommended food consumption norms.

3. *Assessing self-sufficiency in normative consumption.*

In addition to the abovementioned indicators, the level of self-sufficiency is evaluated by the share of domestic production in food consumption in accordance with the recommended (rational) norms stipulated by modern requirements for healthy diet (Order of the Ministry of Health, 2016):

$$SSR_N = \frac{(DP - L)}{DC_n}, \quad (10)$$

where DC_n denotes the consumption level in accordance with rational norms.

In the study, the level of consumption in accordance with rational norms was calculated as the amount of food products available to consumers and adjusted for the degree of rational norms achievement. The latter was determined as a ratio of actual consumption of food staples to rational norms of food consumption.

Food self-sufficiency is also affected by import diversification. In the current research, the degree of import resource diversification is determined as a diversification index R_D that is the reciprocal of the concentration of importers (y):

$$R_D = \frac{1}{\sum_{i=1}^k y_i} . \quad (11)$$

The higher the concentration index, the higher the degree of market monopolization and, consequently, the lower the diversification level of imports, and vice versa.

4. Results

Russia is an active participant in international trade and is involved in both food imports and exports. Nevertheless, the Rosstat method for calculating self-sufficiency allows for imports only and does not take into account food exports that reach 30% and more by certain product groups. For example, since 2013, grain exports have been at the 30 percent level of domestic production. Export of fish and fish products exceeded 50%, and at some points it reached 60% (Fig. 1).

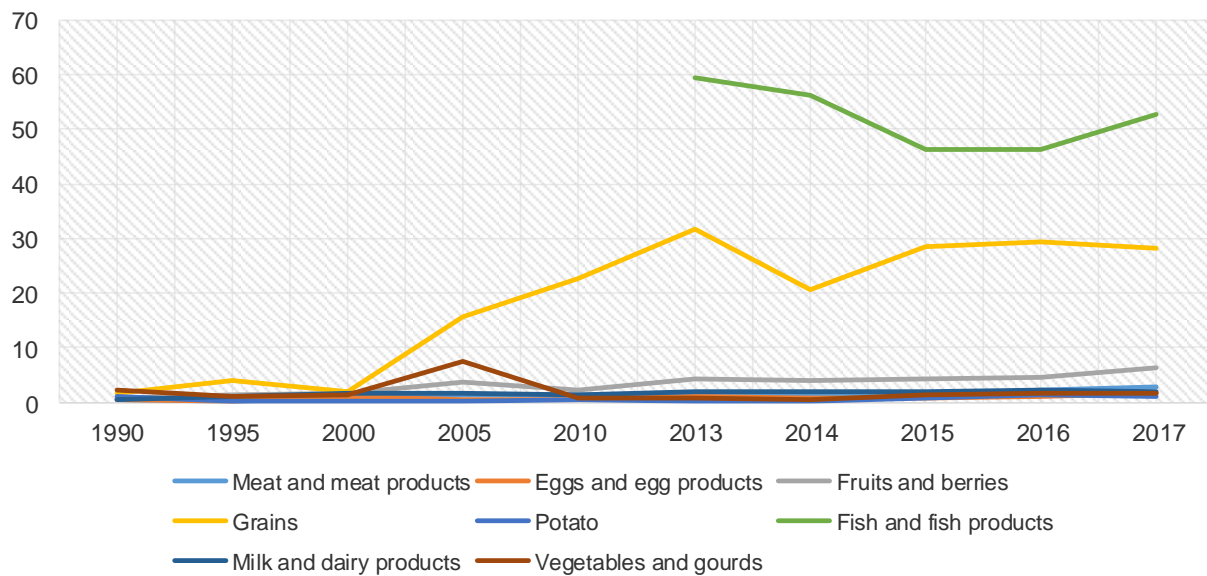


Fig. 1. Share of Russian exports of agricultural products by product groups, %

As follows from the logic of food balance sheets, Rosstat's approach and the method based on normative consumption should deliver the same result with zero net export (which is possible in the absence of international trade or when exports equal imports) and zero losses.

In terms of the given product groups, there is a 40-percent difference in self-sufficiency calculated by the Rosstat method and that developed in the current study. In 2017, according to Rosstat's estimates, self-sufficiency in grains reached 170.65%, whereas a third of the output was exported and not delivered to the national market. According to the proposed method, self-sufficiency in grains in 2017 was 129%. Such a discrepancy in the results is observed throughout the entire period under consideration. For the fish and fish products group, the share of exports exceeds 50%; however, according to the Rosstat method and the authors' approach, self-sufficiency ratio for different periods varies within 2–20%, which is due to the large share of imports. In 2013, net exports

amounted to 381 thousand tonnes of fish and fish products, while exports reached 2 694 thousand tonnes (59.57% of fish catch).

Table 1. Self-sufficiency ratios for food staples

Indicator	1990	2000	2010	2013	2014	2015	2016	2017
<i>Meat and meat products</i>								
SSR _C	86.98	69.65	72.16	78.08	83.70	88.61	90.75	92.50
SSR _{RL}	87.29	66.94	72.14	78.45	82.74	88.69	90.62	93.47
SSR _N				79.15	84.85	88.61	91.99	95.04
SSR _R	88.36	67.15	72.33	78.62	82.90	88.86	90.78	93.61
<i>Grains</i>								
SSR _C	87.48	89.59	211.81	111.59	127.36	133.72	121.92	129.17
SSR _{RL}	91.37	102.54	93.32	141.18	154.60	149.93	161.05	172.02
SSR _N				137.17	156.55	162.97	148.59	157.43
SSR _R	91.53	102.51	93.42	140.43	153.80	149.15	160.08	170.65
<i>Milk and dairy products</i>								
SSR _C	89.51	88.65	80.33	77.29	77.56	80.63	81.55	82.76
SSR _{RL}	86.22	88.24	80.37	77.05	78.12	79.88	80.66	82.28
SSR _N				58.50	57.04	57.80	57.96	58.57
SSR _R	86.32	88.33	80.44	77.13	78.21	79.97	80.74	82.36
<i>Eggs and egg products</i>								
SSR _C	97.42	97.68	98.59	98.14	98.01	97.74	97.84	98.99
SSR _{RL}	96.92	97.50	98.32	98.00	97.59	98.16	98.60	98.86
SSR _N				104.18	100.65	100.75	102.73	106.23
SSR _R	97.24	97.59	98.57	98.21	97.76	98.36	98.77	99.10
<i>Potato</i>								
SSR _C	99.69	96.79	136.45	97.93	93.84	91.74	101.34	99.62
SSR _{RL}	95.43	99.54	72.10	96.21	97.90	102.19	92.77	90.53
SSR _N				105.55	96.97	92.76	101.34	99.62
SSR _R	103.32	102.66	77.02	101.44	103.22	108.29	98.96	97.06
<i>Vegetables and gourds</i>								
SSR _C	83.62	82.67	83.66	84.12	82.02	84.69	87.92	84.89
SSR _{RL}	77.00	85.19	76.28	82.54	83.64	86.38	86.99	87.20
SSR _N				61.89	59.76	61.71	64.06	63.06
SSR _R	82.21	88.20	78.79	85.58	86.56	89.42	90.04	90.19
<i>Fruits and berries</i>								
SSR _C	52.50	50.74	25.25	29.95	34.58	33.65	35.94	33.33
SSR _{RL}	49.20	55.26	26.01	31.05	31.75	31.74	35.92	32.40
SSR _N				17.97	21.79	20.19	21.57	19.66
SSR _R	57.13	56.33	27.05	32.08	32.83	32.81	36.88	33.40
<i>Fish and fish products</i>								
SSR _C	-	-	-	116.70	111.30	127.21	125.46	146.77
SSR _{RL}	-	-	-	112.66	115.22	133.14	141.13	139.05
SSR _N	-	-	-	115.11	112.82	122.01	122.61	143.44
SSR _R	-	-	-	113.56	116.17	134.28	142.37	140.10

Source: calculated using the data of Rosstat 2019.

The agricultural sector in Russia experiences quite significant losses in certain food groups. For example, in 1990, losses in the product group “Fruits and berries” reached 14% (Fig. 2). By 2013, they were reduced to 3%. As for

the product group “Vegetables and gourds”, in 1990, losses were over 6%; by 2013, the level was lowered to 3.5%. Losses in potato not only remain at the highest level, but also continue increasing. The minimum loss in potato was witnessed in 2000 (3.03%); by 2017, it increased to 6.73%. Significant losses in the Russian crop production are due to a lack of modern high-tech storage facilities, poorly developed infrastructure, and a vast territory, which increases the time of transportation of perishable products from the manufacturer to the final consumer.

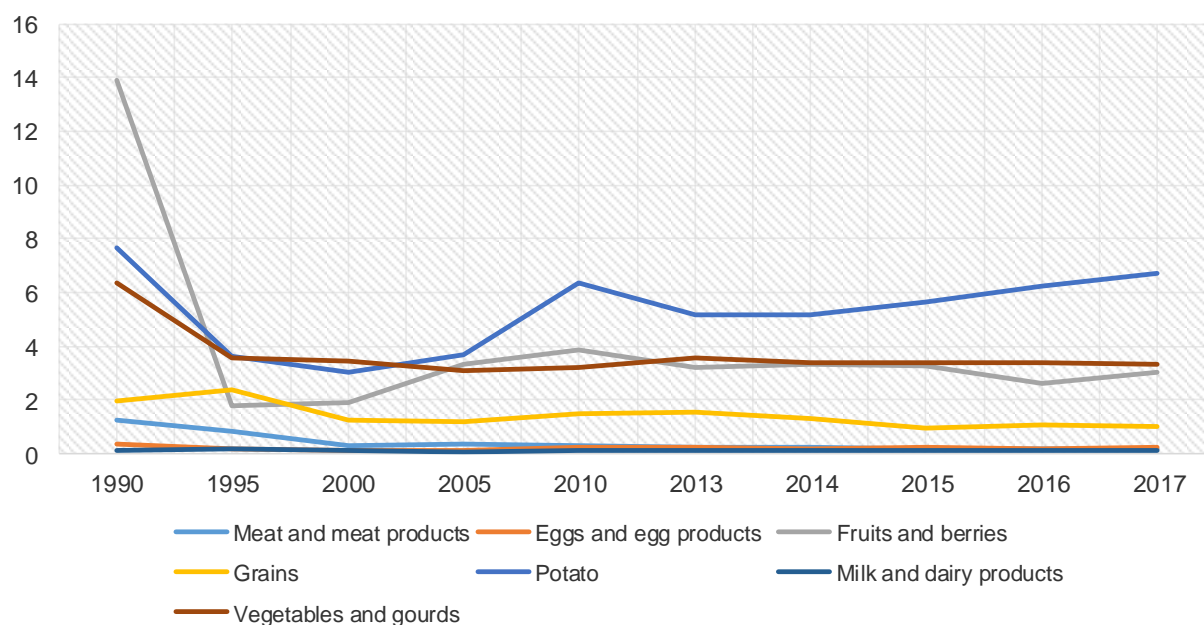


Fig. 2. Losses in agricultural products, %

Source: calculated using the data of Rosstat 2019.

Serious losses exert a marked effect on self-sufficiency. In 1995, self-sufficiency in fruits and berries, with a loss level of about 14%, calculated according to the Rosstat method was 57.13%, and according to the method adjusted for the loss rate – 49.2%.

Self-sufficiency ratio determined by the authors’ method showed that self-sufficiency of some product groups started growing prior to the active implementation of the import substitution policy. For example, self-sufficiency in grains was increasing throughout the entire period under study; since 2005, there has been an increase in self-sufficiency in meat and meat products. Self-sufficiency in milk/dairy products and fruits/berries was falling from the beginning of the 1990s to the mid-2000s. Russia has not yet managed to reach the self-sufficiency level of the 1990s. Self-sufficiency in eggs and egg products remained at a high level throughout the entire period under examination; an insignificant rise in the product group “Vegetables and gourds” occurred in 2012.

Nevertheless, when comparing food self-sufficiency in 2013 and 2017, we can note a substantial rise in self-sufficiency in grains, fish and fish products; a moderate growth in meat and meat products; an insignificant increase in milk and dairy products, vegetables and gourds, eggs and egg products; and a decline in self-sufficiency in potato and fruits and berries.

The primary target indicator of Russia’s Food Security Doctrine is the level of achievement of rational norms of food consumption per capita (Table 2).

Table 2. Level of achievement of rational norms of food consumption

Food group	Rational norms, kg/year/person	Actual consumption / Level of achievement of rational norms					
		2012	2013	2014	2015	2016	2017
Meat and meat products in terms of meat	73	74	75	74	73	74	75
		-	1.01	1.01	1.00	1.01	1.03
Milk and dairy products in terms of milk	325	246	245	239	233	231	230
		-	0.76	0.74	0.72	0.71	0.71
Eggs and egg products, pieces	260	276	270	267	268	273	279
		-	1.06	1.03	1.03	1.05	1.07
Potato	90	97	94	93	91	90	90
		-	1.08	1.03	1.01	1.00	1.00
Vegetables and gourds	140	103	102	102	102	102	104
		-	0.74	0.73	0.73	0.73	0.74
Fruits and berries	100	60	63	63	60	60	59
		-	0.60	0.63	0.60	0.60	0.59
Bread products	96	118	118	118	117	117	117
		-	1.23	1.23	1.22	1.22	1.22
Fish products	22	21.7	22.3	22.3	21.1	21.5	21.5
		-	0.99	1.01	0.96	0.98	0.98

Source: calculated using the data of Rosstat 2019b; Order of the Ministry of Health..., 2016).

Changes in the consumption indicators show that, after a fall in the quality of nourishment in 2014 and 2015, consumption increased and neared the recommended norms, excluding fruits, vegetables and dairy products. In this regard, consumption of bread and alimentary paste is significantly higher than the recommended norms. At that, the nutritional value of the existing diet is also not satisfactory (Table 3).

Table 3. Nutritional value of the existing diet, gram per day/family member

Nutrient	Rational norm	2013	2014	2015	2016	2017
Protein	82	78	78	77	80	80
		95.1%	95.1%	93.9%	97.6%	97.6%
Fat	95	106	105	105	109	108
		111.6%	110.5%	110.5%	114.7%	113.7%
Carbohydrate	417	337	333	328	341	338
		80.8%	79.9%	78.7%	81.8%	81.1%
Energy value, kcal/day	2850	2626	2603	2575	2675	2655
		92.1%	91.3%	90.4%	93.9%	93.2%

Source: calculated using the data of Rosstat 2019b; Order of the Ministry of Health..., 2016).

As shown in Table 3, fat intake exceeds the recommended norm, while carbohydrate and protein intake are 2% and 19% lower than the norms, respectively. In addition, the grocery basket is still low in calories. Another negative factor restricting the availability of foodstuffs of some product groups is a decrease in import diversification. The degree of diversification calculated for 4 and 20 largest importers demonstrated a fall in diversification (Table 4).

Table 4. Changes in diversification of food imports

Product group	2013	2018
<i>Products of animal origin</i>		
Degree of diversification R_{D4}	2,3753	1,6181
Degree of diversification R_{D20}	1,1455	1,0881
<i>Vegetable products</i>		
Degree of diversification R_{D4}	3,1447	2,9586
Degree of diversification R_{D20}	1,3514	1,2788
<i>Foods, drinks, tobacco</i>		
Degree of diversification R_{D4}	3,2362	3,0960
Degree of diversification R_{D20}	1,3351	1,3387

Source: calculated using the data of Federal Customs Service 2019.

The greatest fall in import diversification in 2018 in comparison with 2013 occurred in products of animal origin (by 0.7572), almost 40% of which were imported from the Republic of Belarus.

Thus, the calculation of food self-sufficiency in Russia by the share of domestic food resources production (the Rosstat method) proves that the country's self-sufficiency level is rather high. As a result, a number of experts (Shagayda et al., 2018) suppose that the objective of the import substitution policy is accomplished and the country is food independent.

To sum up, Russia is self-sufficient in fish products and grains, while there is an excessive intake of bread and alimentary paste if compared with the recommended norms. Self-sufficiency in dairy products, vegetables and fruits is low, which makes these products quite expensive and, thus, inaccessible for many households, even considering their integral role in healthy diet. If the consumption of some foods is below the level of the established norms and above the rational consumption norms of other cheaper foods, it has a negative effect on the population's health (Pozhidaeva, 2017).

5. Discussion

Economic and physical availability of foodstuffs is of crucial importance for Russia with its significant social differentiation in terms of food consumption and personal income. A number of researchers (Zhiryayeva, 2017) report that spending on food is growing. In 2017, households in Russia spent more than 36% of their total consumption expenditure on food, whereas for households in the European Union this share amounted to 12.2% (Eurostat, 2019). At the same time, the number of minimum grocery baskets reduced from 9.2 in 2013 to 8.15 in 2017. The actual consumption of some foods in Russia lags far behind similar indicators of developed countries. For example, consumption of meat and meat products in Russia is 72.6 kg, in the EU countries – 82 kg, the United States – 110 kg (Shakleina, Shvetsova, & Shaklein, 2018). In comparison with Belarus, Russian meat consumption is 16 kg less, milk and dairy products – 15 kg, eggs – 15 pcs, potato – 58 kg, vegetables and gourds – 34 kg, fruits and berries – 18 kg. At the same time, Russian consumption of bread and alimentary paste is 32 kg more (Chernova, 2018).

A decrease in import diversification, in addition to the risk of short food supply in the event of crop failure or due to other factors, carries the risk of deterioration in the quality of imported products. In 2013, the Netherlands (9.5%), Poland (8.6%), Israel (8.3%) and Spain (8.3%) were the main food importers to the Russian Federation with 100-percent food safety indicator. The share of Turkey in the Russian market for imported foods was 19.8% with food safety indicator of 99.2%. China accounted for only 13.4% of imports with food safety indicator of

97.1%. In 2018, nearly a quarter of vegetable imports came from China (22.6%), followed by Azerbaijan (12.5%), Egypt (10.9%) and Belarus (10.6%) with food safety indicator of 89%, 98.8% and 98.6%, respectively (Global Food Security Index, 2018).

The similar situation is typical of the market for imported meat and meat products, where the share of countries with 100-percent food safety indicator (Germany, Denmark) was reduced in favor of suppliers of lower quality foods (Belarus). In 2018, Belarus held a monopolistic position in the Russian market for dairy products increasing its share to 74.3%. Food safety indicator of the Russian products (97.5%), imports of which were significantly reduced in order to stimulate their domestic production, was also well below the level of developed countries.

Thus, we can argue that Russia's Food Security Doctrine is being implemented without taking into account how it contributes to meeting the population's needs for food. Despite the fact that the term "food security" is based on international practice, there is a conflict between various aspects of the understanding of this term. The reason behind the conflict lies in the interpretation and assessment of food self-sufficiency. Currently, the Doctrine is focused on production, but not consumer. When discussing food security, the first place is given to the growth of domestic production of the required amount of food, rather than ensuring the physical and economic availability of foods for the population (Trotsuk, Nikulin, & Wegren, 2018). At that, food self-sufficiency is calculated according to the resources available, but not to the amount of food delivered for domestic consumption. A rise in food independence through growing domestic production and reducing imports cannot guarantee that the population's needs for high quality food will be satisfied in the amount adequate to the recommended norms.

This discrepancy makes it necessary to clarify the purposes and objectives of the Doctrine and undertake an extensive revision of the list of the core assessment indicators of food security. It is reasonable to expand the list of the Doctrine's performance indicators by including the following ones: the level of self-sufficiency in supply taking into account international trade; the level of self-sufficiency in normative consumption; and the degree of import diversification.

Conclusion

The choice of a national food security strategy depends on the production resources available as well as the level of economic, political and social atmosphere in a country. Russia's Food Security Doctrine stipulates the threshold values of indicators and a methodology for assessing food independence for food staples. There are significant differences in the approaches exercised in Russia and other countries to evaluating the self-sufficiency level. The research results revealed a 40-percent difference in self-sufficiency levels calculated using the Rosstat method and that proposed in the paper. The calculated self-sufficiency ratio showed that for some product groups self-sufficiency started growing prior to the active implementation of the import substitution policy. The revealed contradiction makes it necessary to revise the list of key indicators for assessing food security. Food self-sufficiency calculated using the proposed method indicated that Russia was self-sufficient in only three food groups, while self-sufficiency in other groups was extremely low. The study also demonstrated a decline in the degree of import diversification, which might entail the risk of short food supply in the event of crop failure or due to other factors. The research found that the domestic production of grains exceeded the rational consumption norms, which resulted in the excessive consumption of this type of food if compared to the recommended standards. At the same time, self-sufficiency in dairy products and vegetables was low and self-sufficiency in fruits was extremely low.

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Veronika Yu. CHERNOVA, Associate Professor, Cand. Sci. (Economic), People's Friendships University of Russia, Department of Marketing; Institute of Marketing, State University of Management. Professional interests: world economy, marketing of transnational companies, importsubstitution, product personalization, one-to-one marketing, interactive marketing communications. Recent articles are published in a cooperation with research colleagues in a field of retailer's communication strategies; product personalization, managing data-driven advertising campaigns.

ORCID ID: orcid.org/0000-0001-5951-9091

Alexander M. ZOBOV, Professor, Cand. Sci. (Economic), People's Friendships University of Russia, Head of the Department of Marketing. Professional interests: cooperation with BRICs countries, international marketing strategies, strategic marketing, world economy, marketing of transnational companies, importsubstitution, product personalization, one-to-one marketing, interactive marketing communications. Recent articles are published in a cooperation with research colleagues in a field of retailer's communication strategies; product personalization, managing data-driven advertising campaigns.

ORCID ID: orcid.org/0000-0002-8792-1990

Ekaterina A. DEGTEREVA, Associate Professor, Cand. Sci. (Economic), People's Friendships University of Russia, Department of Marketing. Professional interests: world economy, marketing of transnational companies, importsubstitution, product personalization, one-to-one marketing, interactive marketing communications. Recent articles are published in a cooperation with research colleagues in a field of retailer's communication strategies; product personalization, managing data-driven advertising campaigns.

ORCID ID: orcid.org/0000-0002-8752-5840

Vasily S. STAROSTIN, Associate Professor, Cand. Sci. (Economic), Head of Advertising and PR Department, Institute of Marketing, State University of Management. Professional interests: product personalization, one-to-one marketing, interactive marketing communications. Recent articles are published in a cooperation with research colleagues in a field of retailer's communication strategies; product personalization, managing data-driven advertising campaigns.

ORCID ID: orcid.org/0000-0003-2243-7345

Inna V. ANDRONOVA, Professor, Dr. Sci. (Economic), Department of international economic relations, Peoples' Friendship University of Russia. Professional interests: world economy, import substitution, balance of exports and imports, economic security, interactive marketing communications, multinational corporations, marketing of transnational companies, balance of resources, food security risks, monetary policy.

ORCID ID: orcid.org/0000-0003-1940-6978

Register for an ORCID ID:

<https://orcid.org/register>

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STRATEGIC MANAGEMENT OF THE COMPETITIVENESS OF INDUSTRIAL COMPANIES IN AN UNSTABLE ECONOMY

Tatiana Vitalievna Pogodina¹, Tatiana Viktorovna Muzhzhavleva², Natalya Leonidovna Udaltsova³

^{1,3} *Financial University under the Government of the Russian Federation, 49 Leningradsky Ave., Moscow, 125993, Russia*

² *I.N. Ulianov Chuvash State University, 15 Moskovsky Ave., Cheboksary, Chuvash Republic, 428015, Russia*

E-mail ^{1*} pogodina15@yandex.ru (Corresponding author)

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Abstract. This paper is devoted to developing a set of strategic areas within the system of managing an industrial company in an unstable market economy. The authors have explored the genesis of the theory of competitiveness to identify some of the key attributes of industrial companies' competitiveness in the short and long run. It has been established that both in the short and long run of major significance are financial-economic indicators. The authors have assessed the degree of financial leverage as a summarizing indicator among a set of financial-economic indicators of competitiveness in sectors within Russia's industry within the period 2015–2017, which, overall, has a negative value. Among the key reasons behind Russia's current trends are high levels of financial dependence among companies, low returns on assets, and high interest rates on loans. The authors have identified and analyzed three major strategic areas in the management of industrial companies in an unstable economy, which are as follows: (1) development of a corporate strategy for fostering and boosting companies' competitiveness on an innovation basis; (2) implementation of strategic marketing; (3) implementation of strategic controlling. The paper brings forward a set of priority strategies for competitive industrial companies (horizontal diversification, innovation, or integrated growth), proposes a set of tools of strategic marketing for stimulating technological processes within the industrial complex in an unstable economy, and identifies a set of areas for implementing strategic controlling as a way to practically implement deviation management. The authors accentuate the need to implement a scenario approach to managing an industrial company. The paper brings forward a technique for assessing the effectiveness of a corporate strategy based on gaps between an industrial company's strategic plan and its real potential.

Keywords: industrial complex; unstable economy; strategy for development; strategic marketing; strategic controlling

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1. Introduction

In a climate of an unstable market economy, stiffening competition, and consumers growing more demanding with regard to product quality, of major significance to managing an industrial enterprise are strategic areas that can help minimize the negative impact of the external environment. Taking a strategic approach to managing an

industrial enterprise implies fostering and actualizing competitive advantage and employing appropriate methods for competing which would enable the business entity to operate in the marketplace long and sustainably. Above all, competitive advantage ought to be predicated on the sustainable, advanced, and innovation-focused technological development of the nation's industrial complex (Eddelani, et al., 2019; El Idrissi et al., 2019; Caurkubule et al., 2020).

The Russian economy is currently characterized by unstable development, which largely is due to the effect of economic sanctions imposed by the EU and the US. These restraining measures imply sanctions imposed in a targeted manner, which has found reflection in restrictions that are imposed not on the entire state as a whole but on particular sectors, companies, and natural persons. The imposition of sanctions not only has not stopped but is becoming more stringent, progressive, and uncertain in prospect. In a climate of external restrictions and uncertainty, which may well be long-term in nature, the Russian economy may need to, above all, be oriented toward the use of strategic approaches to managing the competitiveness of the nation's industrial companies.

2. Methods

2.1. Nature of and factors for the competitiveness of industrial companies

Reorienting Russia's economic system from the traditional model of development to an innovation-focused one has been recognized by scholars and practitioners as a key strategic area for the nation's development. Otherwise, the Russian economy risks being long left out of the picture of scientific-technological progress, with most domestic companies currently characterized by low levels of competitiveness.

Despite the fact that Russian industry has a multiparadigm technological base and features production operations of the fifth and sixth technological paradigms, the nation's real sector of the economy is, however, characterized by significant technological lags at this time. More specifically, in machinery manufacturing and machine-tool building Russia is trailing behind the rest of the world by one and a half to two technological generations, which is approximately 20–30 years, given that a generation is 10–15 years.

The current economic climate is having quite a tangible effect on the rate and caliber of economic growth in Russia and the dynamics of its GDP. In the period 2012–2016, the Russian economy posted an average decline of 0.2%, a considerable role in this was played by Western economic sanctions, which only have exacerbated the negative trend (Ministry of Education and Science of the Russian Federation, 2009; Rosstat, n.d.). In order to accelerate economic growth, the state needs to galvanize the activity of the nation's industrial companies, for it takes them less time to adapt to an adverse economic situation and restore equilibrium than it does across the entire national economy as a whole – and that is owing to industrial companies' ability to stay competitive.

Competitiveness, which is a key element of market relations, may be viewed as a complex, multilevel socio-economic system, which suggests the possibility of analyzing, forecasting, and managing it. The first level is the competitiveness of the product, which has a direct immediate effect on the competitiveness of the rest of the remaining levels (the business entity, sector, region, and country). This approach makes it possible to view a company's product as a tool for engaging in intrasectoral and intersectoral competition.

Linked with the competitiveness of the product is the competitiveness of the production company itself, which is characterized by the degree to which the firm's potential for turning out a product is aligned with consumer preferences with regard to its quality and is in keeping with the existing supply and the way the company is operating under existing conditions in the marketplace and its ability to withstand pressure from competitors at a certain point *in* or over a certain period *of* time.

Since the 1970s, competitiveness theory has been subject to significant changes (Table 1).

Table 1. Genesis of Theoretical Approaches to Construing Competitive Advantage

Theory	Founder	Time period	Description
Firm and industry equilibrium theory	A. Marshall (1993)	1890s	A key criterion of competitiveness is that a company possesses factors of production that can be put to more effective use than those employed by its competitors.
Theory whereby differences among countries are based on variations in the relative endowments of factors of production	E.F. Heckscher (2006) and B.G. Ohlin	1920s–1930s	Countries tend to export goods that are manufactured using surplus factors and import goods that require the use of, mainly, scarce factors to manufacture.
Monopoly and competition theory	J.A. Schumpeter (1982)	1930s	Monopolies organically incorporate subdivisions that implement innovations, producing an “effective monopoly” – a driver of economic growth.
Competitive forces model	M.E. Porter (2006)	1990s	There are five major forces which form the structure of an industry: (1) threat of new entrants; (2) threat of substitutes; (3) bargaining power of customers; (4) bargaining power of suppliers; (5) competitive rivalry.
Competitive rationality theory	P.R. Dickson (2007)	Late 20 th century	Companies strive to be consistent in organizing their exchange with consumers in the ever-evolving marketplace based on making proper marketing decisions, which has come to be known as competitive rationality.
Strategic competitiveness theory	R.A. Fatkhutdinov (2005)	2000s	A methodology for forecasting competitiveness which reflects an entity’s potential ability to compete with similar entities in the future within a given marketplace.

Source: Compiled by authors

In order to boost the competitiveness of domestic industrial companies going forward, the state must find a way to influence a set of factors which shape it. These factors may be divided into two major groups – short-term (operational) and long-term (strategic).

In the short run, a competitive enterprise is characterized by the following attributes:

- ability to achieve medium rates of increase in sales proceeds and revenue;
- ability to achieve the average regional indicators of profitability;
- ability to meet consumer demand across key groups of products on a par with the closest competitors;
- limited ability to expand the product range and implement cutting-edge production and information technology due to lack of funding;
- ability to maintain its share of the market for a year.

However, in the long run the competitiveness of industrial companies is characterized by somewhat different attributes, which include the following:

- sustainable dynamics of increase in sales proceeds and the profitability of the company’s financial-business activity;
- availability of financial reserves to ensure the company’s sustainable development and improved working and social conditions for its workforce;
- the company’s product mix volume and structure fully matching consumer demand in all consumer segments;
- optimum product price and quality ratios;
- high levels of manpower potential;
- good condition of the company’s material-technical production base, above all its fixed assets;
- high-quality pre- and post-sales service for the target consumer, including warranty service, which is the basis of the client’s long-term allegiance to the company;

- the company facing little to no risk of getting pushed out of the market by its competitors for a period of 5 years and up;
- high investment attractiveness and potential for implementing large investment projects using both the company's own and borrowed funds (Egorova, 2011).

Thus, the concept of and factors for competitiveness may vary depending on the period under review. The short-term period is dominated by operational indicators, while the long-term one – by strategic indicators of competitiveness. Strategic areas for managing the competitiveness of industrial companies ought to be oriented, mainly, toward strategic indicators in combination with current indicators.

2.2. Assessing the effect of financial-economic factors on the competitiveness of industrial companies based on the degree of financial leverage

The authors' analysis revealed that, when it comes to assessing the effect of various factors on the competitiveness of industrial companies, the effect of financial-economic indicators is there both short- and long-term. A summarizing indicator of the effect of financial-economic indicators on the competitiveness of industrial companies is the degree of financial leverage (DFL), which can be computed in the following way:

$$DFL = DER \cdot (ROA - LIR) \cdot (1 - T) \quad (1)$$

where

DER is the debt-to-equity ratio;

ROA is the return on assets;

LIR is the average interest rate on loans;

T is the profit tax rate.

A positive value for the DFL signals boosts in return on a firm's equity capital, which has a favorable effect on its investment attractiveness and its competitiveness in the internal and external markets. The authors estimated the DFL across the key types of activity by Russia's industrial companies based on the average interest rates on loans (13.0% in 2015 and 9.4% in 2017) (Table 2).

Table 2. An Assessment of the Degree of Financial Leverage across Particular Types of Economic Activity by Russian Industrial Companies within the Period 2015–2017

Type of activity	Debt-to-equity ratio		Return on assets, %		Degree of financial leverage, %	
	2015	2017	2015	2017	2015	2017
Extraction of mineral resources	0.88	0.85	11.7	10.4	-0.95	0.68
Manufacturing, including:	2.75	2.47	4.0	4.4	19.8	9.9
-production of food products	2.65	1.95	5.9	6.5	15.1	4.5
-production of chemical substances and chemical products	2.44	1.45	9.5	8.1	6.8	1.5
-metallurgical production	2.10	1.52	6.7	10.6	- 10.6	1.5
-production of machinery and equipment	2.89	8.90	2.1	-12.4	- 25.2	- 153.8
-production of electrical equipment	1.98	1.55	5.6	6.0	-11.7	- 4.2

Source: Data from Rosstat (n.d.).

Thus, as clearly evidenced from Table 2, the situation is adverse in most sectors within the nation's industry. In 2017, Russia's DFL had a positive value only in extraction of mineral resources and metallurgical production. The situation is most complicated when it comes to machinery and equipment production, which is testimony to

the uncompetitiveness of industrial companies engaged in this type of economic activity. On the whole, notably, the period 2015–2017 was characterized by positive dynamics in manufacturing, especially in chemical production, production of electrical equipment, and production of food.

The DFL's negative value is associated with the lack of macroeconomic coordination between the efficiency of the production sector and lending policy pursued in the financial sector of the economy. The average interest rate in European countries is a lot lower than in Russia. For instance, in 2016 it was 5.9% in Germany, 4.8% in Italy, 3.9% in the Czech Republic, and 2.7% in Switzerland. The lowest interest rates on loans were recorded in Asian countries, namely 4.4% in China, 3.4% in South Korea, and 1.0% in Japan (Rosstat, n.d.). With interest rates on loans this low, the DFL's value will, obviously, be positive in the majority of a nation's production companies.

3. Discussion

The current slow-down in Russia's industrial growth is associated with a number of factors related to an unstable economic environment, which have exhibited negative dynamics on account of a sanctions package introduced by the EU and the US.

Russia's industrial production has been impacted by a plethora of negative factors that are specific to this particular nation, like declines in the investment attractiveness of the manufacturing industry, a poor scientific-technical component, a primary focus on raw materials, and declining consumption due to drops in the population's real income.

Below is an outline of some of the key strategic areas for managing the competitiveness of industrial companies (Figure 1).

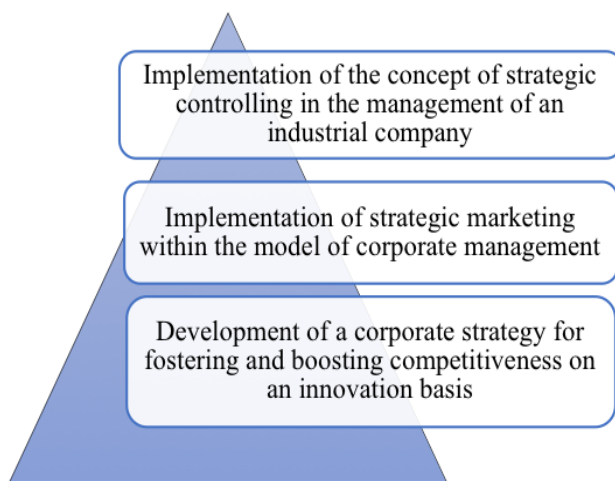


Fig. 1. Key strategic areas for managing the competitiveness of industrial companies in an unstable economy

Source: Compiled by authors

Thus, a unifying beginning is the development of a corporate strategy aimed at fostering and boosting the competitiveness of industrial companies. This strategy provides the framework conditions for systematic and long-term activity aimed at minimizing threats imposed by competitors, identifying competitor vulnerabilities and designing effective ways to exploit them, and identifying effective channels for avoiding head-on collision with competitors as a result of the development of a new product or business model (Heckscher, 2006).

Once there is in place a strategic focus on marketing, it will increasingly play a major role in the overall management of a firm. It may be stated with confidence that at the present stage the entire model of managing a company is essentially founded on interaction between strategic and operational marketing.

An area that can also help enhance strategic management and boost the effectiveness of managerial decision making is strategic controlling. There is a great deal of relevance in employing strategic controlling to help resolve issues related to the formalization of a firm's strategic objectives and development of scenarios for its future development.

3.1. Corporate strategies for fostering and boosting a company's competitiveness on an innovation basis

The right choice of strategy is a determining factor for boosts in the competitiveness of industrial companies. In the long-run, strategies for competitive companies must rely on long-term factors for competitiveness and be oriented toward radical action on their part, including the development and introduction of new goods and services. This approach is most optimal for large and medium-sized industrial companies that hold sway in the marketplace. Thus, industrial companies with this level of competitiveness may want to adopt strategies of horizontal diversification, innovation, or integrated growth.

A strategy of horizontal integration facilitates the formation of technological chains among companies, which will help achieve favorable terms on the purchase of raw materials and supplies and provide the best potential for the pursuit of a uniform production-industrial policy. A strategy of diversification stimulates boosts in a company's market share via greater sales proceeds and increases in the number of regular customers and suppliers, and, ultimately, helps ensure the optimum distribution of resources and stable growth in revenue.

Uncompetitive enterprises may need to mainly focus on the use of defensive strategies aimed at maintaining their positions and surviving in the marketplace – only after having accumulated the required resource and innovation potential will they be able to proceed to the next, higher, level of competitiveness.

Corporate strategies may vary significantly depending on different phases within the lifecycle of the innovation process. Of particular note are strategies of investing in the initial and final stages of the innovation-investment process. Industrial companies that pursue the first type of strategy have in place innovation-related units that are engaged in research and development. This type of companies possesses significant innovation potential and increased investment attractiveness and helps develop various creative types of economic activity within their sector.

Strategies of investing in the final stages of the innovation-investment process are common among industrial companies with a small innovation potential. These companies tend to employ process or product imitations and engage in the technological transfer of early majority innovative insights, which they adapt to the conditions of their own business system, having in consideration the market niche they occupy and their potential for selling the product within an existing group of consumers. This type of innovation strategies is practiced by followers and the late majority.

3.2. Implementing strategic marketing within the model of corporate management

An analysis of various models of management of present-day companies indicates that there, actually, is a very deep and dynamic interrelationship between strategic marketing and strategic management. In today's climate of market transformations and increased orientation toward the consumer, strategic marketing may be viewed as a

significant management tool which helps draw together and coordinate all functional units within the company based on the corporate strategy adopted.

A comparative analysis of the way strategic marketing is organized in Russian and certain foreign enterprises indicates that the development of the market economy in Russia is characterized by a poor focus on the development and practical implementation of marketing efforts. Note that not all companies within industry have marketing units in place, and those that do tend to have them perform functions that normally would lie outside their ambit, i.e. often there is no clearly defined domain of issues for these staff members to be concerned with and no sound system of marketing research in place, with market exploration mostly performed in a haphazard manner.

Within strategic marketing, a leading role is played by innovations marketing, which has a prospective orientation and a focus on performing functions that are associated with the determination of consumers' informed preferences in respect of an innovative product; the conduct of integrated research into the market and economic conditions surrounding industrial production; the design of particular features of an innovative product based on the monitoring of consumer preferences in real time; the development and implementation of a marketing plan for promoting innovations; adjustment of the marketing plan by reference to deviations detected; the monitoring of the efficiency of the firm's marketing activities.

The average expenditure by Russian companies on the marketing of innovative products is not more than 10–15% of all expenditure on innovation activity, which is not enough to ensure the effective commercialization of innovations. In addition, in Russia the share of organizations engaged in marketing innovation is not more than 1.5%. Industrial companies prioritize technological innovation, followed in degree of significance by organizational innovation, with marketing innovation bringing up the rear on the list.

A key reason behind the insufficient implementation of innovations marketing in the activity of industrial companies is the predominant use of outmoded mechanisms for managing innovation processes. Members of the senior management of innovation-focused companies tend to set a primary focus on an innovation's useful features; they will then focus on looking for sources of funding – and only lastly will they focus on identifying potential sales markets and analyzing their capacity.

Thus, there may be inconsistencies in the relationship between the innovation-focused organization and the end consumer of the innovative product. Resolving this issue may require putting in place an intermediary that will help the firm better conduct its innovation activity, i.e. developing new organizational-economic forms of entrepreneurship – centers for commercialization of technology and technological platforms.

It may help to undertake the following activities right in the early stages of the innovation-investment process:

- putting together and getting to the developer of strategic marketing a set of “selling information” indicators in the form of its “selling aspects”, which will shape consumer competencies and informed needs;
- developing fundamental functionalities via non-technological (marketing and organizational) innovation;
- developing appropriate measures to prevent and counteract risks at all stages of the innovation process;
- putting together investment guides at the meso and micro levels.

Thus, based on the product's commercial viability, functionality employed in the innovation process may be viewed as fulfilled only after the innovation is perceived by the mass end consumer. This is a long-term process that is based on the implementation in industrial companies of the concept of strategic marketing (Romanova, 2007).

3.3. Implementing strategic controlling in managing an industrial company

In a climate of the ever-growing complexity of market relationships, a highly uncertain external environment, and a complicated financial-economic situation, companies are getting increasingly keen on the use of the latest scientific approaches to substantiate their strategic managerial decisions. Many European countries have made successful use of strategic controlling, which is known to help facilitate positive dynamics of strategic management in industrial companies, boost their competitiveness, and foster the long-term development of their scientific-technical and resource potential. A strategy developed by reference to fundamental techniques and tools of strategic controlling should enable a company to achieve a competitive edge in the long run and attain boosts in indicators of return on its financial-economic activity, which can ensure positive values for the DFL.

One of the key areas of strategic controlling is diagnosing the effectiveness of a strategy. An industrial company must compare on a regular basis the desired and expected trajectories of its development. The desired trajectory of development is determined by the company's strategic objectives, while its expected trajectory is established via forecasting. If the above trajectories diverge, there will be a gap between desired and expected indicators (Romanova, 2007).

The effectiveness of an industrial company's corporate strategy is determined by the gap between its strategic plan and its real potential. To boost the effectiveness of the corporate strategy, one needs to develop appropriate activities to eliminate the gap. A possible preventive activity aimed at overcoming such gaps is the scenario method. Major indicators employed in working out scenarios for the development of industrial companies are those that are subject to open publication in and are calculated based on financial reporting (sales proceeds, sales profit, return on investment, return on assets, return on equity, and product profitability).

Scenario analysis is a crucial theoretical-methodological component of strategic controlling. The effectiveness of corporate strategy may be viewed as high if the gap between the industrial company's strategic plan and its real potential is no more than 15%, medium – 16–30%, reduced – 31–49%, low – 50–70%, and very low (unsatisfactory) – 71% and up. Thus, deviations inside the first four zones may be viewed as acceptable, while they should be seen as unacceptable inside the fifth zone.

A key role in assessing the efficiency of commercial companies must be played by the analysis of rates of increase in economic value added, and in assessing that of stock companies – in shareholder added value, following the implementation of an innovation project (Buckley, Clegg, & Wang, 2007).

This tenet is predicated on that it is economic (shareholder) value added that reflects in full measure a company's attractiveness from a standpoint of the value-oriented approach and improvements in the caliber of decision making aimed the achievement of strategic objectives for its development (Gnezdova, Kugelev, Romanova, & Romanova, 2016).

Given that the technological development of the Russian economy is hardly possible without the use of relevant marketing tools at the federal and regional levels, it may be advisable to conduct marketing research via the latest organizational-economic forms of entrepreneurship (e.g., technological platforms and innovation-focused industrial clusters), which can facilitate boosts in the commercial effectiveness of activity by industrial companies. A key purpose behind the use of the tools of marketing in a context of this kind is to create a favorable environment for the effective activity of science-driven production operations within the Russian economy via the implementation of horizontal and vertical integration and optimization of business processes at industrial companies (Austrade, 2010; Sölvell, Lindqvist, & Ketels, 2003).

Conclusion

The authors' analysis revealed that the potential for managing the competitiveness of industrial companies is, above all, determined by their strategic focus. To be able to achieve major changes in the structure of their production and enhance their innovation component, companies need to ramp up their innovation potential based on the development of a sound corporate strategy and implementation of strategic marketing and strategic controlling.

Some of the key areas in a strategic approach to managing an industrial company that is oriented toward an innovation-based path of development include:

- identifying the “principal link” in the company’s production-business process and focusing on it the bulk of its managing effort;
- employing strategies of horizontal diversification, innovation, or integrated growth;
- ensuring systemicity in the operation of production and functional units, with a targeted focus on orienting their activity toward the implementation of long-term plans for innovation-investment development.

The implementation of strategic marketing within the model of corporate management envisages the following activities:

- putting together and getting to the developer of strategic marketing a set of “selling information” indicators, which will shape consumer competencies and informed needs;
- developing fundamental functionalities via marketing and organizational innovation;
- putting together investment guides for potential investors at the regional, sectoral, and corporate levels.

The implementation of the concept of strategic controlling in managing an industrial company envisages the following set of activities:

- implementing a system of deviation-based management of the company;
- employing a scenario approach as a methodological component of strategic controlling;
- assessing the effectiveness of corporate strategy based on gaps between the industrial company’s strategic plan and its real potential and developing a set of preventive activities on precluding these gaps from emerging.

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- Tatiana Vitalievna POGODINA**
ORCID ID: orcid.org/0000-0002-6619-4229
- Tatiana Viktorovna MUZHZHAYLEVA**
ORCID ID: orcid.org/0000-0002-2948-7225
- Natalya Leonidovna UDALTSOVA**
ORCID ID: orcid.org/0000-0003-0521-4588



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INNOVATIVE PROCESSES' MANAGEMENT IN AGRICULTURE AND FOOD SECURITY: DEVELOPMENT OPPORTUNITIES

Zhanar Ordabekovna Tokhayeva ¹, Botagoz Zhenisovna Almukhambetova ², Bektur Keneshbayev ³,
Kamshat Akhmetova ⁴

^{1,2,3} Khoja Akhmet Yassawi International Kazakh-Turkish University, B. Sattarkhanov Ave., 29, Turkestan, 161200,
Kazakhstan

⁴ Bokeikhan Str., 8/175, Nur-Sultan, 010000, Kazakhstan

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Abstract. In this paper, the dynamics of the food independence of the Republic of Kazakhstan have been analyzed, and its quantitative assessment has been made. The results of the study show that over the years of its independence, Kazakhstan has made some progress in strengthening the country's food security. At present, the malnutrition among the population of Kazakhstan is considerably lower than that of other countries in the Central Asian region and is at the same level as in economically developed countries. At the same time, the study results show that there are problems in the country: the actual consumption of the most important food remains extremely low in relation to the determined standards. In general, 2013 – 2017 display positive dynamics of the food independence, and the indicators of crop yields sustainably grow. In many ways, this has become possible due to the introduction of innovative technologies in the agricultural production of the Republic of Kazakhstan. However, despite the growth of the innovative activity of agricultural enterprises, the level of development and implementation of agricultural technologies in Kazakhstan remains extremely low. Having studied the experts' opinions, the authors single out priority measures for the development of the agricultural innovation system aimed at strengthening the country's food independence: promoting the research program targeting small farmers, creating favorable infrastructure for food systems, contributing to the farmers' and scientists' knowledge flows: expanding the agricultural production and strengthening the human potential, encouraging the development of scientific, technological and innovative applications on key food safety issues.

Keywords: agricultural innovation system, agrotechnologies, food independence, food security, level of malnutrition, level of innovative activity.

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1. Introduction

The agriculture and the world food system face the challenge: to provide 9.7 billion people with food by 2050 in the context of the reduction in land and water resources (UN DESA, 2015; Moumen et al., 2019).

Over the recent decades, the Republic of Kazakhstan has made considerable progress when fighting the food insecurity: in 2015 – 2017 the level of malnutrition was less than 2.5 % (in 2004 – 2006 this indicator was 5.9 %). Agricultural land can no longer be expanded because a considerable area of the global arable land has already been involved in production. The rest of the land is increasingly being lost as a result of urbanization or must be restored in order to preserve the habitat and bio diversity, as well as to create climate buffers.

In addition, the irrational overuse of freshwater resources as a result of irrigation causes the reduction in water supplies for the agricultural industry in the Republic of Kazakhstan, and the increased risk of the climate change and the uncertainty of the geopolitical landscape affect the food security.

The problems on the resources reduction and the population growth are worsened by changes in diet in many developing countries, including the Republic of Kazakhstan. Nowadays the consumption of animal protein and fresh products is increasing in the Kazakhs' diet. This, ultimately, will require a higher level of production of the main source of protein, carbohydrates and nutrients: crops.

The financial and energy crises deepened the poverty and had negative impact on the food security of developing countries. Over the past five or six years, international food prices have risen, which makes food less accessible to many people and attracts attention to deeper structural deficiencies in the global food production system.

In addition, over the past 40 years, technologies and methods of agriculture have caused the degradation of productive land, large greenhouse gas (GHG) emissions and considerable water pollution. All of these factors threaten the sustainability of food production.

Sustainable fighting hunger and malnutrition and protection from high and unsustainable food prices will require a fundamentally different approach to the agricultural development and food production. This implicates the creation of a comprehensive national framework for the sustainable management of natural resources, as well as the adoption of technologies and innovations required to improve the productivity, profitability, and sustainability of rural production systems.

In the global economic environment, the competitiveness of the Republic of Kazakhstan and the ability to maintain the most important natural resources will largely depend on its ability to introduce innovations in these aspects of the production system.

The urgency of the problem of innovative development of the Kazakh agriculture is due to the fact that the development of innovations will update the technological, as well as organizational and economic base of agriculture, and contribute to strengthening the country's food security and its integration into the world market.

2. Literature review

According to various publications on food safety, this concept is multifaceted, differently defined and interpreted. On the one hand, food security implies the availability of adequate supplies at the global and national levels. On the other hand, the problem is in the adequate and balanced nutrition and well-being (Eche, Hernández-Herrera, 2018).

The concept of food security emerged in the XX century during the global food crises (Bobe et al., 2019).

In the 1970s, food security was determined by fluctuations in the food availability, as well as instability in food grain prices (Consolidarea securitatii alimentare si nutritionale mondiale-Concluzii ale Consiliului, 2018).

In this regard, it was believed that in order to maintain steady growth of food consumption, as well as to compensate for the fluctuations in food grain prices, an adequate global food supply was required at all times (Maitra, 2018). The emphasis on supply issues reflects a change in the organization of the global food economy, which is considered responsible for these crises (Béné et al., 2019).

Since that time the conceptualization and the measurement of food security have been intensively discussed (Briones Alonso et al., 2017). However, the subsequent works of a number of scientists (Butler, McFarlane, 2017; Dubé et al., 2014; Ericksen, 2008) provided a multidimensional understanding of food security and poverty.

These scientists stated that unequal access to food and its distribution due to the lack of economic resources and the capabilities of individuals were important aspects of food security. This differentiated the ability of a state to provide a constant supply of food at the national level and the ability of individuals or households to access available food (Chesnoiu, 2019).

Food security is a multidimensional operational structure, which had got more than 200 definitions by 1993 (Consolidarea securitatii alimentare si nutritionale mondiale-Concluzii ale Consiliului, 2018). This situation was clearly “unsustainable” and reflected the fact that the food security research often had a very specific context depending on which of the many technical perspectives and political issues were discussed (Ericksen, 2008).

The classical interpretation of food security defined in the 1970s was revised at the 1996 World Food Summit to reflect the importance of distribution, food quality, and equality of economic access (Amoroso, 2018).

The summit helped to normalize the multidimensional importance of food security, and stated that food security was a situation that existed when all people at all times had physical and economic access to sufficient, safe and nutritious food that met their dietary needs and food preferences for an active and healthy life (Frison et al., 2011). Despite the fact that scientists continue rethinking the concept of food security, this definition still remains the basis of research in the area of food security (Borch, Kjærnes, 2016).

The concept of food security was also largely studied in the context of human rights, means of existence (Eakin, 2017), women’s problems and gender issues in the area of development (Ahmed et al., 2016), import substitution (Agababayev et al., 2020), food quality and safety (Zezza et al., 2017), organic agriculture, as well as sustainable environment (Muller et al., 2017).

These works transformed the concept of food security from the macroeconomic analysis of food supply into a microeconomic or intrafamily understanding of food distribution that takes into account gender equality, the environment and human aspirations and dignity (Allen, Prosperi, 2016).

The definition of food security was reconsidered for the last time in 2016 at the expert meeting of the Food and Agriculture Organization of the United Nations (FAO) that was challenged to develop the indicators measuring food security globally. The FAO experts state that food security is usually defined by the following aspects: food availability, food use, and food sustainability (Srinivas Sucharitha, Lee, 2018).

These aspects form a common basis for the definition developed by the FAO: “food security is a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life” (FAO, 2016b).

Many researchers note that to ensure food security and to realize the right to food, agricultural innovations are essential (Haile et al., 2017).

The FAO plays a key role in promoting the importance of innovations in agriculture for improving food security, sustainable development, and promoting rural development. According to the FAO, agricultural innovations are a process that enables individuals or organizations to introduce new or existing products, processes or ways of organization for the first time in a particular context in order to improve their performance, competitiveness, and resistance to external shocks to solve a certain problem.

L.P. Pant states that resource-intensive farming systems, which are among the main causes of massive deforestation, water scarcity, soil depletion, and high GHG emissions, cannot ensure sustainable food and agricultural production (Pant, 2019). It is necessary to have the innovative systems that protect and expand the base of natural resources while increasing the productivity.

Innovations are not limited to technologies. They also include social, economic, institutional/organizational processes and policies that have impact on the activity of farms (Brooks, Loevinsohn, 2011).

The number of references that explain the role of innovations in agriculture is constantly increasing. The experience of certain countries related to the adaptation and innovations in the agricultural production is considered in the works of Brooks and Loevinson (2011), Cook (2010), a joint study of Clark, Bean, Raji, Loveridge, et al. (2017), etc.

The studies mainly rest on the qualitative analysis (Hermans, 2017), and avoid formal methods. However, recently more structured approaches to assessing innovation processes and opportunities in agriculture have attracted attention (Schut et al., 2015; Shagaida, Uzun, 2015). Such approaches can also help to meet stronger requirements to monitoring and evaluating in projects and programs.

At the same time, it is necessary to note the need in the further studies of the development of systematic instruments that make it possible to identify both stimulating and limiting factors of innovation.

3. Methods

The purpose of this study is to develop offers on creating the terms and conditions for the innovative development of the agricultural industry in order to ensure the food security in the Republic of Kazakhstan.

The main research methods are the comparative analysis of quantitative indicators characterizing the food security and the food independence, and the bibliometric analysis of scientific publications on the problems of innovative development of the agricultural industry.

Scientific references and analytical materials were searched for by using public sources of the FAO statistical database as the most complete global source of information in the area of food security and agricultural innovations, publications of the Ministry of Agricultural Development of the Republic of Kazakhstan, Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan.

The FAO system of indicators was used to assess food security: the level of malnutrition, agricultural production per capita, as well as indicators based on the statistical data of the Statistics Committee – the level of food independence by products and the overall level of food independence of the country.

The food independence (FI) by products was defined by the method and calculated by using the following formula (Shagaida, Uzun, 2015):

$$FI = (PV: PV) \times 100,$$

where PV was the production volume + stock change (stock at the beginning of the year minus the one at the end of the year), and

PV was the volume of personal and industrial consumption.

Since the export volume was taken into account in the “production volume” indicator, the level of food independence by products could exceed 100 %.

4. Results

Kazakhstan has adopted a number of national development programs aimed at supporting the overall economic development as well as agricultural development. In 1997, the government set out its vision in the *2030 Kazakhstan Strategy*: prosperity, security and improvement of the Kazakhs’ welfare. It emphasizes the importance to develop agriculture, forestry, and the food industry to settle such structural problems as employment and poverty. *2030 Kazakhstan* is implemented through a series of ten-year plans. The current one is a strategic plan for the development of the Republic of Kazakhstan until 2020, approved in 2010. It identifies agriculture and food industry as key areas of the economic diversification and food security: export of agricultural products, improvement of the productivity and processing of meat, milk, fruits and vegetables.

After revising the *2030 Kazakhstan* strategy, in 2012 the government adopted the *2050 Kazakhstan Strategy* in order to maintain high rates of the economic growth and improve sustainability. As for agriculture, the key issues of the new economic strategy include modernization of the agricultural sector, the development of agriculture and small and medium-sized enterprises (SMEs) in the area of agricultural processing and trading, improving water resources policy.

Ten-year plans are transformed into successive five-year development programs. In 2013, the Government of Kazakhstan approved the Agricultural Development Program for 2013 – 2020 (also known as *2020 Agribusiness*) aimed at improving the competitiveness of agricultural producers by improving the financial assistance, agricultural marketing and management efficiency.

In 2017, the government adopted a new State Program for the Agro-Industrial Development for 2017 – 2021 aimed at improving the agricultural production and export. Over the next four years, Kazakhstan expects an increase in the profitability of its grain industry by 30 – 40 % due to the introduction of a new state scheme for the distribution of grants, new organic standards, and a transition from growing wheat to corn and soybeans.

Recently, Kazakhstan and other CIS members have adopted the *2010 CIS Food Security Concept* in order to ensure food security as an integral part of the economic security and to preserve the sovereignty. The main purpose of this document is to form a coherent agro-industrial policy, as well as to timely respond to fluctuations at the world food markets. The concept provides the measures to ensure mutually beneficial trade relations, to create and operate markets for meat and dairy products, and the turnover of fruits and vegetables in the CIS.

In Kazakhstan, the main policy of the agricultural sector aims at reducing the dependence on food import and improving the domestic food production. The Ministry of Agriculture together with the Ministry of Industry and New Technologies introduced a number of incentives for local producers to improve the efficiency and local food consumption, to encourage the development of the national agro-industrial complex and agriculture within the economic diversification. As a part of the *2030 Kazakhstan Strategy*, the government has begun to provide direct assistance and subsidies to local food producers and processors.

As a result of the taken measures, some progress was made in enhancing the country's food security. Thus, the malnutrition among the Kazakh population is considerably lower than that of other countries of the Central Asian region. At the same time, the average level of malnutrition is steadily decreasing (Table 1).

Table 1. Malnutrition (%) (for Three Years on Average) in the Countries of the Central Asian Region, Russia and Belarus

	2004 – 2006	2010 – 2012	2015 – 2017
Central Asian Region	11	6.7	6
Kazakhstan	5.9	2.7	< 2.5
Kyrgyzstan	9.7	7.8	6.5
Turkmenistan	4.8	4.9	5.5
Uzbekistan	14.5	8.2	7.4
Russia	< 2.5	< 2.5	< 2.5
Belarus	3	< 2.5	< 2.5

Source: compiled by authors

According to Table 1, the level of malnutrition in the Republic of Kazakhstan is less than 2.5 %, which is comparable to the indicators of economically developed European countries.

The food production and trade in the Republic of Kazakhstan have changed considerably over the past decade: the average volume of food production per capita for three years increased from \$370 in 2004 – 2006 up to \$430 in 2015 – 2017. The analysis of the dynamics of the food consumption by the Kazakh population showed that the actual consumption for seven out of top ten food products was below the defined standards (Figure 1).

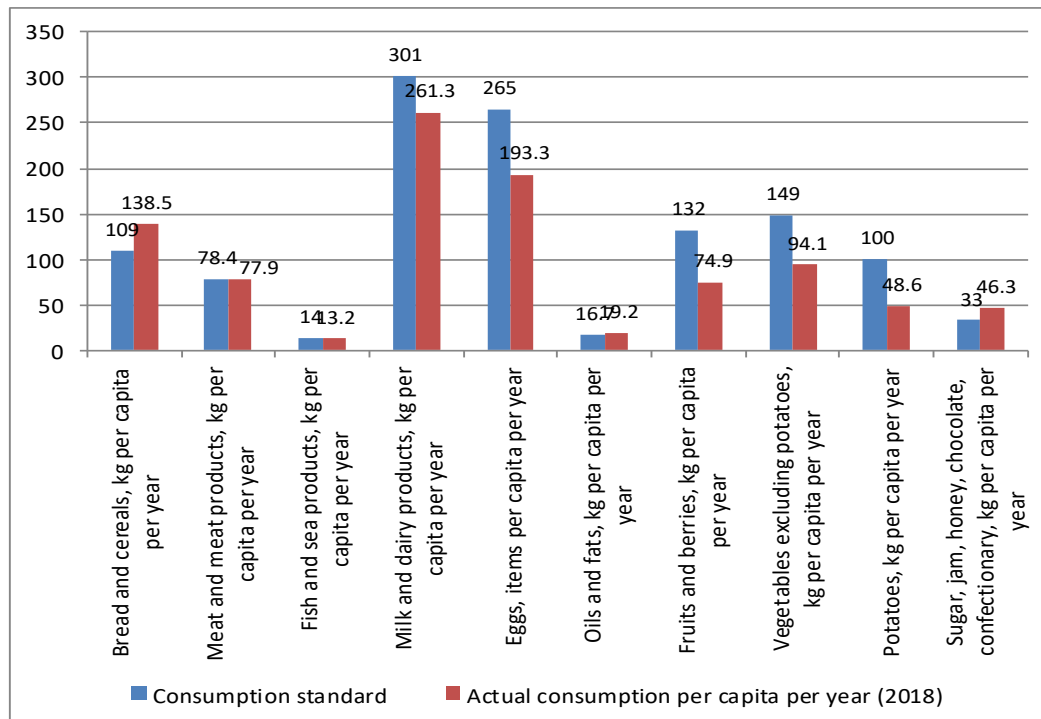


Fig. 1. Food Consumption in the Republic of Kazakhstan in 2018 (Prilozheniye k prikazu Ministra natsionalnoy ekonomiki Respubliki Kazakhstan ot 9 dekabrya 2016 goda No. 503; Komitet po statistike RK. Potrebleniye osnovnykh produktov pitaniya naseleniyem, n.d.)

Source: compiled by authors

For the analyzed period of 2013 – 2017 Kazakhstan completely provided itself with grain crops, grain processing products, and sunflower seeds. In 2017, the food independence by all grain crops (except for buckwheat) was more than 100 %, i.e., Kazakhstan provides with grain not only its inhabitants, but also the population of other countries of the world.

It is necessary to note the positive dynamics in the self-sufficiency of potatoes, meat and meat products, eggs and egg products, grain processing products, and sunflower (Table 2).

Table 2. Food Independence by Main Types of Food in 2013 – 2017 in the Republic of Kazakhstan (Rasschitano avtorom po dannym Komiteta po statistike Respubliki Kazakhstan, n.d.)

Types of food	2013	2014	2015	2016	2017
Potatoes	95.9 %	97.6 %	95.8 %	98.4 %	103.6 %
Meat and meat products	76.1 %	79.3 %	81.8 %	82.7 %	81.3 %
Milk and dairy products	89.1 %	88.7 %	91.8 %	90.8 %	91.5 %
Eggs and egg products	96.7 %	98.5 %	101.5 %	102.2 %	105.7 %
Grain	141.9 %	138.7 %	130.9 %	138.1 %	138.7 %
Grain processing products	185.5 %	179.7 %	175.6 %	201.8 %	202.2 %
Fruits and berries	18.4 %	15.8 %	19.9 %	23.0 %	30.6 %
Beetroots	100.0 %	100.0 %	100.0 %	103.1 %	92.1 %
Sunflowers	109.6 %	131.7 %	134.0 %	136.6 %	163.3 %
Oil and oil containing products	80.3 %	81.7 %	70.1 %	70.1 %	79.7 %

Source: compiled by authors

During the analyzed period in the Republic of Kazakhstan there is a deficit in the production of fruits and berries: the domestic production does not cover the country's needs in fruits and berries. The deficient volumes of fruit and berry products are imported from other states of Central Asia, Russia, Iran and China.

In general, in 2013 – 2017 the food independence of the Republic of Kazakhstan increased for most food products, and is at a fairly high level. Fruits and berry products are an exception.

During the period under consideration, the grain yield increased from 11.6 dt/ha in 2013 up to 13.4 dt/ha, oil crops – from 8 dt/ha up to 9.7 dt/ha, sugar beets – from 267.7 dt/ha up to 274.4 dt/ha, potatoes – from 181.5 dt/ha up to 194.2 dt/ha, field vegetables – from 238.7 dt/ha up to 253.7 dt/ha, and melons and gourds – from 212.4 dt/ha up to 224.2 dt/ha.

In many ways, this became possible due to the introduction of innovative technologies in the agricultural production of the Republic of Kazakhstan. As compared to 2013, in 2017 the domestic expenditures of the enterprises for the R&D in the area of agricultural sciences increased by 899.9 million tenge and amounted to 6,528 million tenge. The largest amount of innovative expenditures made by agricultural enterprises themselves was noted in 2015, reaching 7,602.4 million. However, over the past two years, this figure has been steadily decreasing by an average of 7.3 % per year.

For 2013 – 2017 the level of innovation activity of agricultural enterprises increased from 8.5 % up to 9.6 % (Figure 2).

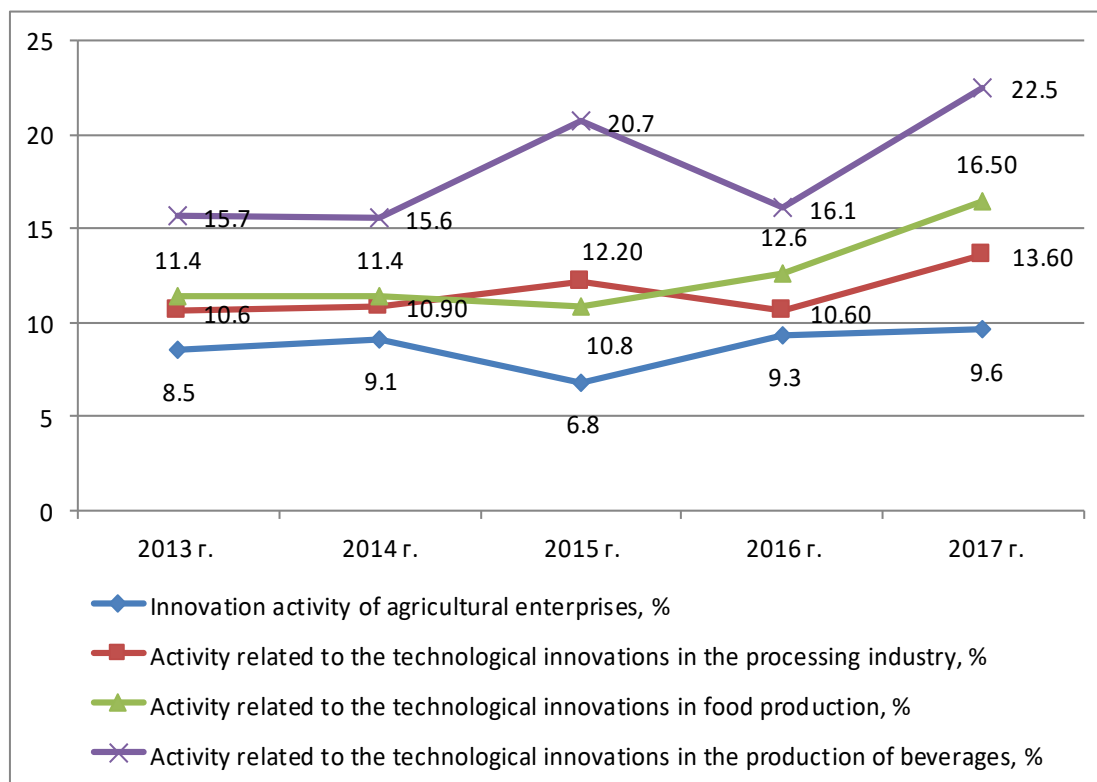


Fig.2. Innovation Activity in Agriculture and Processing Industry of the Republic of Kazakhstan in 2013 – 2017

Source: compiled by authors

Over the past five years, scientific organizations have got 3,197 protection documents of the Republic of Kazakhstan. More than 365 applications for alleged inventions have been filed, and over 775 patents were received for 2015 – 2017. Three inventions were registered with the Eurasian Patent Office. One certificate of discovery in the area of soil science was issued.

At the same time, the analysis of the situation in the agricultural sector of the Kazakh economy shows that the level of development and implementation of modern agricultural technologies and technologies for processing agricultural products remains extremely low.

5. Discussion

According to Daniel Gustafson, the FAO Deputy Director General for Programs, innovations are required in all segments of the food chain, and, what is as important, investments in innovations in the food system can pay off very well when creating jobs, if the whole value chain from the producer to the end user is considered.

Experts of the noncommercial JSC National Agrarian Science and Educational Centre (noncommercial JSC NASEC) note that the intensification of production is not real without the use and implementation, transfer of innovative technologies of the modern science, digital solutions, and international exchange.

In order to improve the efficiency of the agro-industrial production and ensure sustainability of the food system of the Republic of Kazakhstan, it is necessary to make further efforts on developing innovations and technological modernization of agriculture and the processing industry in the following areas:

1) Promoting the research program targeting small farmers

The constantly changing ecological, environmental, as well biodiversity context requires continuous studies and developments in order to get and share the knowledge on maximizing agricultural yields and preserving the environment.

Studies at the national and international levels should cover a more complex set of tasks: new challenges (climate change, renewable energy sources and energy efficiency, biodiversity and resource management), on the one hand, and old ones, on the other hand (productivity growth and product quality), as well as promote diversification.

For example, at the national level, the Agricultural Academy of Bulgaria supports high quality agricultural studies and developments, and since 1994 the Thai Research Foundation has provided more than 800 research projects on food issues and made a special focus on the local community participation.

When developing programs for the sustainable development and promoting agricultural innovations, it is interesting to study the experience of the Swiss Federal Agricultural Administration – the leader of the Sustainable Food Systems Program within the Ten-year Framework Program on Sustainable Consumption and Production Models. This program is a multifaceted initiative on the transfer to more sustainable food systems that provide food security and nutrition for the present and future generations of the country.

In order to conduct joint research programs on food security, it is necessary to deepen the cooperation with international research institutions, such as the consortium of international agricultural research centers (CGIAR). The CGIAR is a global partnership uniting the research organizations involved in the studies to provide food security in the future. The studies are conducted by the network including 15 research centers, known as the consortium of international agricultural research centers. These centers are located around the world. As a rule, the centers operate in partnership with other organizations, including national and regional agricultural research institutes, civil society organizations, scientific circles, and the private sector.

The recent international discussions on the development of a new strategy and framework of the results for the CGIAR (previously the consultative group on international agricultural studies) for 2016 – 2030 emphasize more inter sectoral approach to research topics, taking due account of the socio-economic study and overcoming the lack of comprehensive agricultural research for the development purposes.

In this regard, joint studies remain a challenge: in addition to the supervision and coordination of international agricultural research, the CGIAR can potentially play more active role as an intermediary and a network agent, promoting innovative platforms at the strategic and international levels, especially contributing to the dialogue and clarification of complex sector phenomena and its context.

2) Creating favorable infrastructure for food systems

The infrastructure provides many scientific and technical applications that relate to aspects of the food system. For the local food system to prosper in the Republic of Kazakhstan, it may be necessary to create a large part of the food industry infrastructure for small and medium-sized farms. Farmers need centers to combine products, commercial kitchens to create value-added products (such as jams or sauces), slaughterhouses, and value-added meat processing enterprises. Producers also need access to various markets and sustainable agricultural land, and the food system is connected to the existing networks for the transportation, distribution, storage, and other critical needs. When planning new initiatives to stimulate the economic development, local governments should

take into account their agricultural assets and types of the consumer demand, as well as the offers that are available in their region.

The first step to improving the local food infrastructure is to assess and understand the strengths and weaknesses of certain regions of the Republic of Kazakhstan. The example is the operation of the NC Growing Together (USA) project where a supply chain infrastructure map was made for all 100 North Carolina districts, and intermediate categories such as processing, distribution, cold storage, and aggregation were identified. The map is based on the industry data that are reliable for each district. However, constant local knowledge and participation are required to continuously check and add data. The data are searchable by district and by category and can be downloaded to an Excel spreadsheet for their analysis or use in the majority of commercial mapping programs.

The most important role in ensuring the food security of the country is assigned to information and communication technologies (ICT). For example, it is possible to see how the community supports ICT instruments in the Sauti ya wakulima project. The project implements the interdisciplinary methodology called the ERV (Enabling Reciprocal Voice) methodology, developed as a part of the interdisciplinary PhD research project at the Zurich University of the Arts (ZHdK). According to Eugenio Tisselli, the information technology expert and independent consultant from Barcelona, the methodology is based on using and sharing common smartphones, creating audio-visual documentation of the farmers' agricultural and social environment, published on the shared web platform. Audiovisual documentation consists of a photograph, an explanatory voice recording, and a keyword used to classify the content. These elements are enriched with the geographic reference information on an interactive web map. Since 2011, groups of farmers in the United Republic of Tanzania (the Bahamoyo District) have been involved in the proof of concept project. The farmers have documented their strategies for dealing with unstable weather phenomena, pests and diseases, as well as other aspects the farmers consider relevant for describing their agricultural realities.

In five years, Sauti ya wakulima was fully accepted by the farming communities, operates autonomously, and is supported by the Bahamoyo agricultural administration and the farmers themselves. The farmers have created a rich knowledge base containing over 3,000 images and audio recordings.

This knowledge base also includes a detailed map of the local knowledge based on the farmers' interviews with the people living in their communities and beyond. The local government provided a group of participating farmers with grants and encouraged them to document farm exhibitions and agricultural fairs in other cities, including the largest agricultural fair in Morogoro. The ERV methodology was modernized in 2016 and is currently being expanded by Swissaid, the Swiss development organization, to cover thousands of small farmers in the Masashi region in the south of the United Republic of Tanzania deprived of food security.

3) Contributing to the farmers' and scientists' knowledge flows: extending the scales of the agricultural production and strengthening the human potential

Services on sharing the knowledge can help farmers to resolve a number of issues including the agronomic practice, natural resource management, livestock health protection and management, access to financial support, and markets and/or market intermediaries.

This is a striking example of the knowledge share impact on the agronomic practice when Ethiopian farmers grow teff grass (teff grass – national grain). Farmers traditionally disperse their seeds (i.e., the seeds are hand-scattered across the field) and hope that more seeds will generate more yield. The researchers in Ethiopia have shown that planting seeds in rows (rather than dispersing them) can increase yields by 50 – 80 %, reduce the number of seeds required for sowing by 90 %, as well as produce teff grass with larger leaves and stronger stems.

It is necessary to develop innovative forms of production and share knowledge, e.g., community innovations, innovation platforms, and joint studies.

4) Encouraging the development of scientific, technological and innovative applications on key food safety issues. There is a wide range of research issues that should play a certain role in planning and implementing science, technology and innovations (STI) related to food security. They must be resolved at all levels – from international cooperation to farmers. Far from all topics will be equally relevant in all cases, but their importance and interaction are crucial to achieve the goal of eradicating hunger and malnutrition in a truly sustainable way.

- Synthetic biology

In the conditions of limited and contaminated arable land and water resources, the current efforts are focused on searching for new solutions to these problems, without creating an additional burden on the environment. However, the improved awareness of the role of nutritious food for the human health and the concept of “food as medicine” increased the demand for “functional food”.

The “cellular agriculture” and “biosensors” are the two main instruments that help to ensure sustainability in the food and agricultural industries.

The cellular agriculture makes it possible to produce food with higher nutritional or medical value, as well as food with longer shelf life and without harmful ingredients, such as allergens for the susceptible population. The enrichment of soil or raw materials with engineering microorganisms acting as biosensors that contribute to the detection of pathogens or pollutants supplements resistance to pathogenic agents and improves the quality of food products of animal or vegetable origin.

These and similar innovative solutions contribute to the transfer of sustainable agricultural practice and food industry to a new era, where less resources are used to produce more healthy food.

- Artificial intelligence

Automated irrigation systems, crop health monitoring, livestock recognition systems, CBR systems for the fish industry, and many others are good examples of how artificial intelligence can be implemented in agriculture. One of the brightest examples of how the artificial intelligence is used in agriculture is the innovative project of Veepro, the Dutch company, on creating an information center for dairy cattle.

Veepro has created an expert artificial intelligence system that can prescribe feed rations, medications, and health and well-being conditions for livestock. It may recommend mating partners to improve the genetic potential of the offspring. The expert system can make a comprehensive analysis of the health, the reproduction of individual or groups of animals, monitor production and recommend prompt measures to be taken for improving the productivity of the farm.

- Selection and support of local seed systems

A good example of the need in public investments for researching and distributing technologies are breeding programs and the support of local seed systems that allow distributing locally adapted genetic material that farmers would have the right to freely save, exchange and sell. The examples of seed bank programs include the Portuguese National Gene Bank and the Navdanya network of seed custodians and organic producers in 18 Indian states.

- Agroecology

The agri-environmental science has the potential to create more sustainable food system. There are more and more evidences that agri-environmental solutions can support or improve farmers' profits by providing environmental benefits such as lower soil erosion and water pollution. In addition, according to the studies, the agro-ecology may contain the solutions that simultaneously solve problems related not only to food, but also to energy and water. In the context of these predictions, more and more researchers working in the area of sustainable agriculture emphasize the need in a wider government support for the research.

It is necessary to create more local opportunities for the efficient research in the social and social sciences aimed at eliminating persistent inequalities, such as gender, race, institution, income, and geography.

For such programs to succeed, it is necessary, for example, to provide participatory approaches and secure farmers' rights. These programs need substantial funding and coordination, which should be carried out by specially created organizations.

Conclusions

The study results presented in this paper make it possible to make conclusions about the food security in the Republic of Kazakhstan and the possibilities of innovative agricultural development in order to improve the country's food independence:

- In general, in 2013 – 2017 the food independence of the Republic of Kazakhstan for most food products increased and is at a fairly high level. Fruit and berry products are an exception.
- Despite the positive dynamics of the food independence indicators, Kazakhstan still suffers food security problems: only three of 10 top foods are actually consumed more than the determined standards.
- In order to improve the economic, environmental and social indicators of the agri-food sector, it is necessary to have an efficient innovation system. Despite the proven positive impact of the agricultural R&D on the productivity growth and the contribution to the natural resources use sustainability, the development and introduction of agricultural technologies remain extremely low in the Republic of Kazakhstan.
- In order to strengthen food security, the efforts should be directed towards the development of the agricultural innovation system in the following areas: promoting the research program targeting small farmers, creating a favorable infrastructure for food systems, contributing to the farmers' and scientists' knowledge flows: expanding the agricultural production and strengthening the human potential, and encouraging the development of scientific, technological and innovative applications on the key food safety issues.
- Now there is an urgent need to increase investment in high-quality research that would be consistent with the production models adapted to the needs of small-scale farmers in Kazakhstan.
- STI, including the use of precision agriculture and early warning systems, can mitigate the food instability. New and the latest technologies, including synthetic biology, artificial intelligence and tissue engineering, can have potential implications for the future crop and livestock farming. However, using the potential of such technologies to ensure the food security requires investments in research and development, human capital, infrastructure, and knowledge flows.

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Zhanar Ordabekovna TOKHAYEVA

ORCID ID: orcid.org/0000-0001-6430-5784

Botagoz Zhenisovna ALMUKHAMBETOVA

ORCID ID: orcid.org/0000-0003-0672-5881

Bektur KENESHBAYEV

ORCID ID: orcid.org/0000-0002-4504-1418

Kamshat AKHMETOVA

ORCID ID: orcid.org/0000-0003-4225-3025

Register for an ORCID ID:

<https://orcid.org/register>

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MODELING CRYPTOCURRENCIES VOLATILITY USING GARCH MODELS: A COMPARISON BASED ON NORMAL AND STUDENT'S T-ERROR DISTRIBUTION

Shazia Salamat ¹, Niu Lixia ², Sobia Naseem ³, Muhammad Mohsin ⁴, Muhammad Zia-ur-Rehman ⁵, Sajjad Ahmad Baig ⁶

^{1,2,4} College of Business Administration, Liaoning Technical University, Liaoning province, Xingcheng, 125105, China

³Institute for Optimization and Decision Analytics, Liaoning Technical University, Liaoning province, Fuxin, 123000, China

^{5,6}Department of Management Sciences, National Textile University, Punjab province, Faisalabad, 37610, Pakistan

¹Shaziameher08@gmail.com, ²nlx8941@126.com, ³Sobiasalamat4@gmail.com,
⁴mohsinlatifntu@gmail.com, ⁵zia.msfin@iiu.edu.pk, (Corresponding author) ⁶Sajjad.baig@hotmail.com

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Abstract: This study measures the volatility of cryptocurrency by utilizing the symmetric (GARCH 1,1) and asymmetric (EGARCH, TGARCH, PGARCH) model of GARCH family using a daily database designated in different digital monetary standards. The results for an explicit set of currencies for entire period provide evidence of volatile nature of cryptocurrency and in most of the cases, the PGARCH is a better-fitted model with student's t distribution. The findings show positive shocks heavily affected conditional volatility as a contrast with negative stuns. Those additional analyses can be provided further support their findings and worthwhile information for economic thespians who are engrossed in adding cryptocurrency to their equity portfolios or are snooping about the capabilities of cryptocurrency as a financial asset.

Keywords: Cryptocurrency; GARCH models; Normal Distribution; Student's T Distribution

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JEL Classifications: B26, C01, C19

1. Introduction

Cryptocurrency is a controversial issue for researchers in the recent era, this is just because of its volatile and digital nature is considered as an important concept for many economic and financial applications, such as portfolio optimization and risk management (Bhosale and Mavale 2018). Cryptocurrency is a secure virtual medium of exchange in the form of digital currency by using cryptography to secure and verify the specific transaction (Mukhopadhyay, Skjellum et al. 2016, Chu, Chan et al. 2017, Chuen, Lee et al. 2017). The digital currency eliminates the centralized system or third parties and their high fee of the transaction (Canetti, Dodis et al. 2007). This advanced digital type of currency looks for after to enhance regular money related structure to back trades without incorporation of revealed in unattainable, while making

unquestionable cryptographic guarantees. The trusted outsider third party sustain rescinds reliance over a definite obstacle in both of portion mysterious and installment affirmation.

The vitality about cryptographic authorizations through corroboration of work, which can ensure an unsurprising and exact reliable system in the whole deal, anyway entrapment may rise in without further upheaval installment confirmation (Farell 2015, DeVries 2016, Dyhrberg 2016, Gkillas and Katsiampa 2018). Bitcoin is being introduced as a first cryptocurrency in 2008, after facing the many time's failures by using the centralized system. Nowadays, Bitcoin has become the most popular and high capital contributing legal currency (Glaser, Zimmermann et al. 2014, Cermak 2017). Volatility unswervingly affects pricing, hedging, development of risk management and financial decisions (Ané 2006, Drachal 2017). The volatility of bitcoin is extreme as compare to other cryptocurrencies and affected by previous positive shocks (Bouoiyour and Selmi 2015, Bouri, Azzi et al. 2016, Dyhrberg 2016). (Bouri, Azzi et al. 2016) explained the importance of cryptocurrencies in his research the digital currency not correlated with the prices of traditional assets.

The block chain process registers individual transaction and maintains the record of transactions with specific coding (tokenization & Forking) i.e. past, public and ritualistic transaction verification. The systematic process eliminates the dispute occurring chances and makes transactions more secure and reliable. (Baur and Dimpfl 2018, Conrad, Custovic et al. 2018, Ekinici, Akyildirim et al. 2019) by using the VIX and VSTOXX measured the impact of volatility of cryptocurrency on United State and European financial markets. The study concluded that the volatility of cryptocurrency effect fluctuation of the financial market. (Sockin and Xiong 2018) explained the volatile nature of cryptocurrencies in his research by functioning with 456 digital currencies.

Cryptocurrency indicates a positive relation between volatility and shocks in the Pre-crash period (Bouri, Azzi et al. 2016). The expanded use and idolization of cryptocurrency create a need to measure its volatility. In this study, we expand upon the existing literature by demonstrating cryptographic currency's volatility. The GARCH type model has used with two error distribution techniques to measure the volatility of cryptocurrency as well as the better fitted model from GARCH family. The purpose of this study is to investigate which conditional heteroskedasticity model can describe the divergent cryptocurrencies price volatility better over the whole period.

In section 2 entails on the brief introduction of a specific set of cryptocurrency, Section 3 comprises a source of data and methodology used in this study. Section 4, 5 contain results discussion and conclusion.

Brief introduction of Currencies:

Bitcoin: The first peer-to-peer digital currency allows online payments (Nakamoto 2008, Bouoiyour and Selmi 2015, Dyhrberg 2016).

Ethereum: A virtual and completely programmable currency which comes with moderen febrication of different apps and technologies (Bhosale and Mavale 2018).

Ripple: this digital currency removed blockchain network for convinient access for transctions in contrast to most digital currencies. Its convinient and faster as well as it defenceless against programmer assquaults.

Stellar: An open-source, decentralized convention for computerized money to fiat money exchanges which permits cross-fringe exchanges between any combine of monetary standards. The Stellar convention upheld by a philanthropic, the Stellar Development Foundation.

Litecoin: A cryptographic money that was made with a goal to be the 'advanced silver' contrasted with Bitcoin's 'computerized gold.' It is additionally a fork of Bitcoin, however not at all like its forerunner, it can create squares multiple times quicker and have multiple times the most extreme number of coins at 84 mln.

Monero: A digital currency with private exchanges capacities and a standout amongst the most dynamic networks, which is because of its open and security centered standards.

Dash: It's a two-level system. The main level is diggers that safe the network system and record exchanges, while the second one comprises of 'ace hubs' that transfer exchanges and empower Instant send and Private send sort of exchange. The previous is essentially quicker than Bitcoin, though the last is mysterious.

NEO: It's a brilliant contract organize that takes into account a wide range of money related contracts and outsider dispersed applications to produce over it. It has a large number of indistinguishable objectives from Ethereum, yet it produced in China, which can conceivably give it a few favorable circumstances because of enhanced association with Chinese controllers and local organizations.

Data Description

This study deals with the secondary daily global price indices of particular cryptocurrencies. The sample consist of 8 cryptocurrencies (BTC, ETH, LTC, XPR, XLM, NEO, DASH & XMR) is from top fifteen cryptocurrencies of November 2018, ranked by market capitalization. The span period of data is different for each cryptocurrency due to the availability of data. The data obtained more up to date for this analysis which available publically (Table 1).

Table 1. Research Sample	
Currency/Variable	Sample Period
Bitcoin (BTC)	18 Jul. 2010 to 02 Nov. 2018
Ethereum (ETH)	07 Aug. 2013 to 02 Nov. 2018
Ripple (XRP)	04 Aug. 2013 to 02 Nov. 2018
Stellar (XLM)	05 Aug. 2014 to 02 Nov. 2018
Litecoin (LTC)	28 Apr. 2013 to 02 Nov. 2018
Monero (XMR)	21 May 2014 to 02 Nov. 2018
Dash (DASH)	14 Feb. 2014 to 02 Nov. 2018
NEO (NEO)	09 Sep. 2016 to 02 Nov. 2018

2. Methodology

When modeling volatility deal GARCH family Models, the adequacy of the mean equation is significantly important. Mean equation is given below:

$$\text{Mean Equation with constant, } r_t = \mu + \varepsilon_t$$

This study has to use GARCH type models, i.e. GARCH, EGARCH, PGARCH & TGARCH, each model which has a divergent purpose, with normal error distribution technique to measure the volatility of cryptocurrencies. Specifically, by using GARCH, EGARCH, PGARCH & TGARCH, we modeled the variance for the above Mean equations. The compassion of the result's estimation the distribution assumptions are checked the estimation results of the model. In 1982 Engle examined modeling volatility using conditionally heteroscedastic regression with the Autoregressive Conditional Heteroskedasticity (ARCH) model, but the large lag length is the major problem with such modeling which means large numbers of parameters are required to predict volatility. While using the Generalized Autoregressive Conditional Model (GARCH), conditional variance allows depending upon its lag, typically lessen the number of obligatory ARCH lags when measuring the volatility.

The equation is a general form of conditional variance equation:

$$\text{Variance Equation: } \varepsilon_t = \sqrt{h_t} v_t \sim iid(0,1)$$

Volatility Modeling

The existing family of GARCH type models divided into two main categories, i.e. Symmetric and Asymmetric models. The base of these categories is on; the symmetric models contain the conditional variance only depend on the magnitude not on the underlying assets whereas asymmetric models measure the different effect on future volatility on the same magnitude with negative and positive shocks (Omari, Mwita et al. 2017).

Symmetric Models

GARCH (1, 1) Model

The Generalized Autoregressive conditional Model by (Bollerslev 1986) denotes by GARCH (p,q) has:

$$r_t = \mu + y_t, \quad y_t = \sigma_t \varepsilon_t$$

$$\sigma_t^2 = \omega + \sum_{i=1}^p \alpha_i y_{t-i}^2 + \sum_{j=1}^q \beta_j \sigma_{t-j}^2$$

In this equation r_t denotes the logarithmic return of the financial time series in respect t time, μ is mean value of return's representative, y_t is shows the mean equation's error term as well as it can riven into two stochastic pieces i.e. ε_t and σ_t , ε_t depicts independent and identical distributional zero mean, is assumed to have normal distribution $\omega > 0$, $\alpha_i \geq 0$, $\beta_i \geq 0$, with limitation and σ_t is dependent standard deviation.

GARCH (1, 1) model has presented by the following equation:

$$\sigma_t^2 = \omega + \alpha_1 y_{t-1}^2 + \beta_1 \sigma_{t-1}^2$$

$$\sum_{i=1}^p \alpha_i + \sum_{j=1}^q \beta_j < 1$$

A positive variance guaranteed in almost all the cases, under the following limitations $\omega > 0$ and $\alpha_1, \beta_1 \geq 0$, but a new GARCH extension models which deals with the weakness of GARCH (1, 1) model and capture diverse features of the financial time series, $\alpha + \beta < 1$ show the persistency of data.

Asymmetric Models

Exponential GARCH (1, 1) Model (EGARCH)

(Nelson 1990, Nelson 1991) introduced the Exponential GARCH model which measured the leverage effects (the asymmetry in return volatility). The following equation gives the general form of EGARCH (p,q):

$$\ln(\sigma_t^2) = \omega + \sum_{i=1}^p \alpha_i \left| \frac{y_{t-i}}{\sigma_{t-i}} \right| + \gamma_i \frac{y_{t-i}}{\sigma_{t-i}} + \sum_{j=1}^q \beta_j \ln \sigma_{t-j}^2$$

In this equation, γ is representative of a leverage effect or the asymmetric response parameter that can appear with negative or positive sign to depict the future uncertainty. EGARCH (1, 1) shows in the following equation:

$$\ln \sigma_t^2 = \omega + \alpha_1 \left| \frac{y_{t-1}}{\sigma_{t-1}} \right| + \gamma_1 \frac{y_{t-1}}{\sigma_{t-1}} + \beta_1 \ln \sigma_{t-1}^2$$

For the good news, $\frac{y_{t-1}}{\sigma_{t-1}} > 0$ the equation is:

$$\ln \sigma_t^2 = \omega + (\alpha_1 + \gamma_1) \frac{y_{t-1}}{\sigma_{t-1}} + \beta_1 \ln \sigma_{t-1}^2$$

When bad news, $\frac{y_{t-1}}{\sigma_{t-1}} < 0$ the equation is:

$$\ln \sigma_t^2 = \omega + (\alpha_1 + \gamma_1) \frac{y_{t-1}}{\sigma_{t-1}} + \beta_1 \ln \sigma_{t-1}^2$$

The Threshold GARCH (1, 1) Model (TGARCH)

The following equation represents the Threshold GARCH model (Zakoian 1994):

$$\sigma_t^2 = \omega + \sum_{i=1}^p \alpha_i y_{t-i} + \sum_{j=1}^q \beta_j \sigma_{t-j}^2 + \gamma_i I_{t-i} y_{t-i}$$

Only “I” is a new term in this equation which represents the dummy variable. The threshold GARCH model and the GJR-GARCH model (Glosten, Jagannathan et al. 1993) are almost the same. In TGARCH (1, 1) model, $\varepsilon_{t-1} > 0$ (positive shocks) and $\varepsilon_{t-1} < 0$ (negative shocks) produce a differential effect on volatility. $\varepsilon_{t-1} > 0$ (Positive shocks) have an effect on α (ARCH term) and $\varepsilon_{t-1} < 0$ (negative shocks) on $(\alpha + \gamma)$.

The Power GARCH Model (PGARCH)

The variance equation of Asymmetric Power ARCH (APARCH (p,q)) Model introduced by (Ding, Granger et al. 1993, Ling and McAleer 2002, Tully and Lucey 2007) in the following equation:

$$\sigma_t^\delta = \omega + \sum_{i=1}^p (\alpha_i |y_{t-i}| - \gamma_i y_{t-i})^\delta + \sum_{j=1}^q \beta_j \sigma_{t-j}^\delta$$

Where $\omega > 0$, $\delta > 0$, $\alpha_i \geq 0$, $-1 < \gamma_i$ and $\beta_j \geq 0$ are shows constant, power parameter, ARCH term, Leverage effect as well as GARCH term respectively. With the change of δ 's power the results become different at the power 1 the conditional standard deviation will be drawn, and at the power 2 leverage effects will be estimated and it's become (above equation) classic GARCH model as (Kovačić 2007).

Distribution model and selection criteria

In the analysis of this study Normal Gaussian Distribution which introduced by Carl Friedrich Gauss in 1809 is used (Alspach and Sorenson 1972, Barndorff-Nielsen 1977) with the best fitted criterion of Maximum Log Likelihood (Akaike 1974, Bozdogan 1987), minimum the Akaike Information Criterion (AIC) and The Bayesian Information Criterion (BIC) by (Schwarz 1978) respectively.

Distribution Model

An equation of the error distribution model given below:

Normal Gaussian distribution by Carl Friedrich Gauss in 1809 (Azzalini 1985)

$$\text{Log}L(\theta_t) = \sum_{t=1}^T L(\theta_t) = -\frac{1}{2} \text{Log}[2\pi] - \frac{1}{2} \sum_{t=1}^T \text{Log}(\sigma_t^2) - \frac{1}{2} \sum_{t=1}^T \frac{\mu_t^2}{\sigma_t^2}$$

where $\mu_t^2 = [y_t - \gamma y_{t-1}]^2$

Student's t distribution by (Fernández and Steel 1998)

$$L(\theta)_t = -\frac{1}{2} \log \left[\frac{\pi[v-2] \Gamma\left[\frac{v}{2}\right]^2}{\Gamma\left[\frac{v+1}{2}\right]^2} \right] - \frac{1}{2} \log \sigma_t^2 - \left[\frac{v+1}{2} \right] \log \left[1 + \frac{[y_t - x_t' \gamma]^2}{\sigma_t^2 [v-2]} \right]$$

Selection criteria

Equations of Log likelihood by Akaike (1974) and the Bayesian Information Criterion by (Schwarz 1978) presented below:

$$\begin{aligned} LL &= 2k - 2 \ln L(\hat{\theta}) \\ AICc &= AIC + \frac{2k(K+1)}{n-k-1} \\ BIC &= k \ln n - 2 \ln L(\hat{\theta}) \end{aligned}$$

3. Empirical results

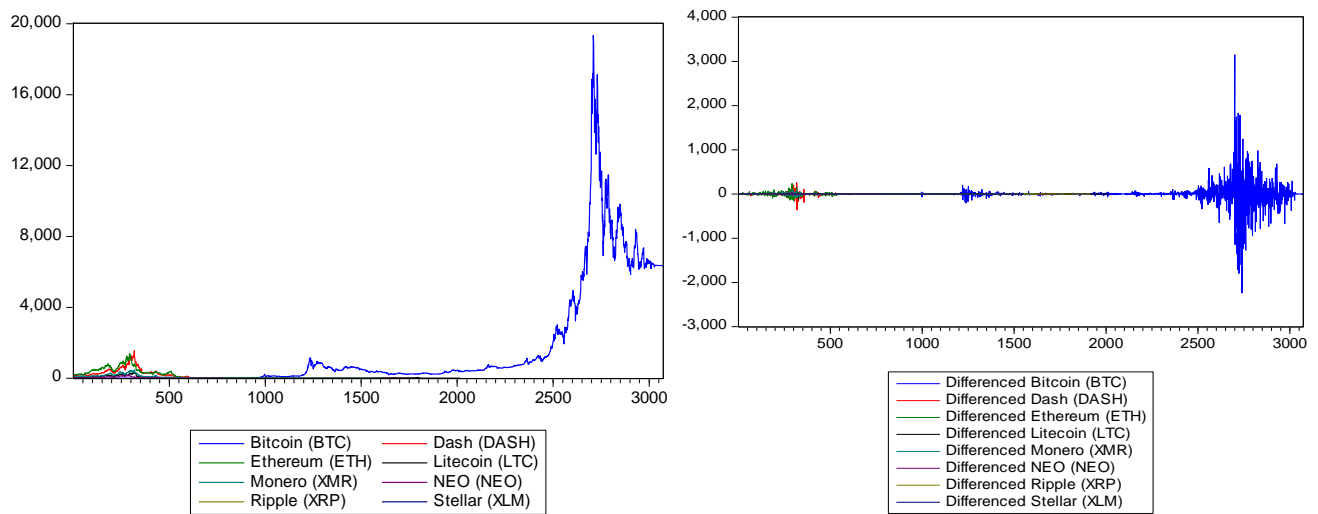
Table 2 comprises the results of descriptive statistics for the daily closing return prices of 8 cryptocurrencies the daily average return of BTC (0.003635), ETH (-0.00362), XRP (-0.00227), XLM (-0.00295), LTC (-0.00123), XMR (-0.00258), DASH (-0.0035) and NEO (-0.00429) with positive standard deviation. Except for Ethereum (ETH), the skewness value of all cryptocurrencies is negative which indicate a long left tail, and the excess kurtosis value from 3 shows the leptokurtic behavior. The Jarque-Bera (JB) test is significant at 1% level, so the statistics value of JB depicts departure from the normality as (Ané 2006, Miron and Tudor 2010, Drachal 2017, Katsiampa 2017). ARCH (5) test for conditional heteroskedasticity rejected the null hypothesis and confirmed the occurrence of ARCH affect in returns of cryptocurrencies which indicates that the GARCH techniques can perform with different specifications (Diebold 2004, Omolo 2014).

Table 2. Descriptive Statistics

	BTC	ETH	RP	LM	LTC	XMR	DASH	NEO
Mean	0.003635	-0.00362	-0.00227	-0.00295	-0.00123	-0.00258	-0.0035	-0.00429
Maximum	0.42458	1.302106	0.616273	0.366358	0.513925	0.378215	0.467565	0.522543
Minimum	-0.49153	-0.41234	-1.02736	-0.7231	-0.82897	-0.58464	-1.27057	-0.80117
Std. Dev.	0.056959	0.078639	0.078217	0.081641	0.067176	0.075264	0.081822	0.104733
Skewness	-0.34428	3.496276	-2.00101	-1.95562	-1.78314	-0.65797	-3.03693	-1.07869
Kurtosis	15.30196	68.91756	29.84154	17.83798	28.86838	8.950268	45.07816	13.38094
Jarque-Bera	19425.66*	216588.6*	58795.98*	15207.02*	57222.06*	2514.512*	129685.5*	3672.328*
Probability	0	0	0	0	0	0	0	0
Observations	3071	1183	1916	1550	2014	1625	1722	784
μ	0.003635*	-0.00362*	-0.00227*	-0.00295*	-0.00123*	-0.00258*	-0.0035*	-0.00429*
Probability	0.001028	0.002286	0.001787	0.002074	0.001497	0.001867	0.001972	0.00374
ARCH (5)	247.6041*	81.79713*	37.12448*	62.49783*	16.90387*	20.87508*	9.351001*	27.40471*
Probability	0	0	0	0	0	0	0	0

1%, 5%, 10% significance level are represented with *, **, *** respectively

Graphical Representation of Cryptocurrencies' Price and Returns



Description of GARCH type Models

The manifestation of ARCH effect allows to applied the GARCH type models on sample data (Shaw 2018). The figurative analysis deals with GARCH (1,1) model for observing the symmetric effect and EGARCH (1,1), PGARCH (1,1) & TGARCH (1,1) for awry effect with Normal & Student's t Error Distribution.

Table. 3 BITCOIN

	Normal Error Distribution				Students' t Error Distribution			
	GARCH	EGARCH	TGARCH	PGARCH	GARCH	EGARCH	TGARCH	PGARCH
Mean	0.001891*	0.004344*	0.002058*	0.002489*	7.24E-07	0.001006*	1.31E-06	-3.03E-09
μ (Constant)	0.000550	0.000196	0.000568	0.000462	2.40E-05	0.000270	2.74E-05	2.33E-07
Variance	0.000069*	-0.614515*	6.75E-05*	0.000440*	1.82E-10	-0.378045*	3.84E-10	5.85E-05
ω (Constant)	0.000002	0.019040	2.31E-06	0.000089	1.21E-09	0.035099	2.65E-09	0.000555
α (ARCH term)	0.213610*	0.365511*	0.230717*	0.220567*	1.397243*	0.487165*	1.160150*	0.542236*
	0.008478	0.011025	0.013994	0.007835	0.690377	0.083689	0.303864	0.122304
β (GARCH term)	0.795849*	0.940209*	0.797679*	1.470625*	0.569058*	0.973009*	0.701818*	0.542684*
	0.005494	0.002293	0.005807	0.054570	0.008551	0.004322	0.008997	0.020473
γ (Leverage effect)	----	0.015886**	-0.038593*	-0.029818***	----	0.010945	-0.262955***	-0.053873
	----	0.007267	0.014113	0.017675	----	0.021766	0.143846	0.049143
δ (Power)	----	----	----	0.807038*	----	----	----	0.816293*
	----	----	----	0.005110	----	----	----	0.007932
$\alpha + \beta$	1.009459	1.305720	1.028396	1.691192	1.966301	1.460174	1.861968	1.084920
LL	5348.701	5349.832	5350.212	5357.922	6059.93	5973.494	6060.853	6270.692
AIC	-3.481	-3.480842	-3.481089	-3.485459	-3.9433	-3.886353	-3.943245	-4.079252
SIC	-3.473	-3.471024	-3.471272	-3.473678	-3.93348	-3.874572	-3.931465	-4.065508
ARCH (5)	0.738	0.404977	0.753036	1.345983	0.000326	0.01257	0.000326	0.000326
Probability	0.595	0.8456	0.5838	0.2418	1	0.9999	1	1
Jarque-Bera	17455.380*	23804.94*	17869.8*	18939.42*	1.20E+09*	6880193*	1.20E+09*	1.20E+09*
Probability	0.000	0	0	0	0	0	0	0

1%, 5%, 10% significance level are represented with *, **, *** respectively

In table 3 the results of first and foremost (Xu and Livshits 2018) digital currency “Bitcoin” are presented. The outcomes of bitcoin show significance at 1% level towards constant of mean and variance under a specific set of GARCH type models with Normal Error Distribution whereas the student's t distribution show significance only under Exponential GARCH model. The leverage coefficient is positively significant in the EGARCH model and negatively significant in TGARCH & PGARCH model at 5%, 1% & 10% respectively with a normal distribution as (Bouri, Azzi et al. 2016).

Under student's t distribution only Power GARCH is significant at 10% level with a negative sign. The results of both distributions indicate the absence of leverage effect, but previous positive shocks or good news has a stronger effect on the subsequent volatility of Bitcoin (Chu, Chan et al. 2017). The Power GARCH is significant at 1% level under both error distribution techniques. The convergence of α & β is $= 1$ or ≥ 1 which direct inconsistency of error term. The selection criterion (maximum LL, minimum AIC, SIC) indicate the Power GARCH model with Student's t distribution is better to fit as (Watanabe, 2010). The ARCH (5) governed Bitcoin Price Index free from the serial correlation and aberrant distribution of error is observed by the significance of Jarque-Bera test at 1% level as (Ané 2006).

Table 4. Ethereum

	Normal Error Distribution				Student's t Error Distribution			
	GARCH	EGARCH	TGARCH	PGARCH	GARCH	EGARCH	TGARCH	PGARCH
Mean	-0.001529	-0.003523*	-0.002422***	-0.00283**	0.000718	0.0001	0.00066	0.000201
μ (Constant)	0.001271	0.001117	0.001426	0.001457	0.001187	0.001178	0.00122	0.001076
Variance	0.000153*	-0.633624*	0.000174*	0.00059**	0.000186*	-0.643994*	0.000208*	0.010127
ω (Constant)	2.63E-05	0.043939	2.77E-05	0.000282	7.21E-05	0.110715	7.75E-05	0.006869
α (ARCH term)	0.242809*	0.405707*	0.136033*	0.229518*	0.305193*	0.448671*	0.237256*	0.226925*
	0.018861	0.027322	0.020594	0.01868	0.081512	0.072602	0.081352	0.040009
β (GARCH term)	0.773658*	0.936608*	0.780136*	1.587702*	0.780331*	0.932065*	0.77336*	0.645491*
	0.015592	0.006071	0.014666	0.164664	0.029358	0.017096	0.030493	0.201822
γ (Leverage effect)		-0.104712*	0.166393*	0.202395*		-0.056031	0.119964	0.013799
		0.016089	0.029912	0.049574		0.039224	0.083484	0.110855
δ (Power)				0.78585*				0.798357*
				0.015635				0.029001
$\alpha + \beta$	1.016467	1.342315	0.916169	1.81722	1.085524	1.380736	1.010616	0.872416
LL	1623.373	1630.278	1629.271	1630.236	1710.708	1720.288	1711.45	1719.873
AIC	-2.737739	-2.747723	-2.746021	-2.745961	-2.883699	-2.898204	-2.883263	-2.895812
SIC	-2.720577	-2.72627	-2.724568	-2.720217	-2.862246	-2.87246	-2.857519	-2.865777
ARCH (5)	1.764135	5.516272*	2.179313**	2.892423*	1.940619	6.632512*	2.213135**	6.741273*
Probability	0.1174	0	0.0542	0.0133	0.085	0	0.0508	0
Jarque-Bera	5175677*	738.1487*	398.7966*	461.1296*	521.9442*	1092.204*	4.54E+02*	1.71E+03*
Probability	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

1%, 5%, 10% significance level are represented with *, **, *** respectively

The results of Ethereum are composed of in table 4 in which easily see the mean constant is significant in EGARCH at 1%, TGARCH at 10% and in PGARCH at 5% level with Normal distribution as well as insignificant with student's t distribution. The constant of variance equation is significant at 5% level under PGARCH model with normal distribution and at 1% level rest of models with both error distribution techniques except PGARCH with student's t distribution. The ARCH and GARCH term are significant at 1% level of confidence in a specific set of GARCH type models with both distribution techniques. The sign of negativity with leverage value has assured the presence of leverage effect in Ethereum price index. Leverage effect is significant under EGARCH with normal distribution at 1% level indicates the negative shocks are having a greater impact on the volatility of Ethereum as compare to positive shocks.

TGARCH and PGARCH also showed a positive significance toward leverage effect which also supports the negative shock impact on volatility. With student's t distribution, leverage effect is insignificant in EGARCH with a negative sign and TGARCH & PGARCH with a positive sign. The coefficient of Power GARCH is significant at 1% level with both distributions. The convergence of α & β is $= 1$ or ≥ 1 which direct error terms are not persistence (Abdullah, Siddiqua et al. 2017). The selection criterion (maximum LL, minimum AIC, SIC) indicate the Exponential GARCH model with Student's t distribution is better to fit as (Bozdogan 1987). The ARCH (5) governed Ethereum Price Index cannot eliminate the serial correlation and significance of Jarque-Bera test shows errors are anomalously distributed.

Table. 5 LITE COIN

	Normal Error Distribution				Student's t Error Distribution			
	GARCH	EGARCH	TGARCH	PGARCH	GARCH	EGARCH	TGARCH	PGARCH
Mean μ (Constant)	0.001033	0.001293**	0.001018	0.001307*	0.000698	0.000785*	0.000561	0.001032*
	0.000665	0.000685	0.000777	0.000232	0.000558	0.000552	0.000555	0.000309
Variance ω (Constant)	5.69E-05*	-0.41575*	5.71E-05*	0.01521*	0.000132	-0.289952*	0.000102	0.014668*
	5.35E-06	0.020343	5.41E-06	0.002112	9.57E-05	0.040762	9.74E-05	0.005575
α (ARCH term)	0.253656*	0.355672*	0.251041*	0.193714*	0.66317	0.431569*	1.12838	0.154944*
	0.013601	0.015881	0.022405	0.011138	0.457579	0.098109	1.036155	0.02637
β (GARCH term)	0.793734*	0.969885*	0.793638*	0.261818*	0.817264*	0.98115*	0.862913*	0.166606***
	0.007762	0.002489	0.007875	0.04659	0.017603	0.005384	0.013815	0.106764
γ (Leverage effect)		-0.018833	0.005046	0.119567*		0.099009*	-0.893885	-0.068347
		0.013316	0.027861	0.048871		0.03877	0.831444	0.113379
δ (Power)				0.810446*				0.850017*
				0.007765				0.015022
$\alpha + \beta$	1.04739	1.325557	1.044679	0.455532	1.480434	1.412719	1.991293	0.32155
LL	3178.346	3237.442	3178.35	3308.811	3484.764	3530.747	3493.715	3568.921
AIC	-3.15228	-3.209973	-3.151291	-3.279852	-3.455575	-3.500245	-3.463471	-3.537161
SIC	-3.141142	-3.19605	-3.137369	-3.263145	-3.441653	-3.483539	-3.446764	-3.51767
ARCH (5)	1.759746	1.555313	1.756065	1.81356	1.48893	1.504354	1.301053	1.98529
Probability	0.1179	0.1695	0.1187	0.1069	0.1902	0.1852	0.2606	0.0778
Jarque-Bera	2917271	2631.758	2913.696	2035.776	2888.775	3325.583	3911.417	2392.004
Probability	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

1%, 5%, 10% significance level are represented with *, **, *** respectively

Table 5 consists the results of Lite coin. The constant of mean is significant under EGARCH, and PGARCH of both distributions and rest of models show an insignificant trend toward mean equation. The constant of variance and ARCH term are significant at 1% level in all except GARCH and TGARCH of student's t distribution. The GARCH term is significant at 10% level in PGARCH with student's t distribution and 1% level under remaining models with both distributions. Leverage effect is positively significant under PGARCH of normal error distribution and EGARCH of student's t distribution. The Power GARCH is significant at 1% level in both error distribution techniques. Maximizing log likelihood and minimizing AIC & SIC governs power GARCH model is the best model for Lite coin from a selected group of GARCH family models. The insignificance of ARCH (5) indicates Lite coin price index has no more serial correlation and the Jarque-Bera's significance shows error is beyond to normal distribution.

Table 6. Stellar

	Normal Error Distribution				Student's t Error Distribution			
	GARCH	EGARCH	TGARCH	PGARCH	GARCH	EGARCH	TGARCH	PGARCH
Mean μ (Constant)	0.002359**	0.005087*	0.004993*	0.00611*	0.003929*	0.004782*	0.004702*	0.005089*
	0.001053	0.001052	0.00118	0.001041	0.001049	0.001055	0.00109	0.000911
Variance ω (Constant)	0.000267*	-0.80859*	0.00023*	0.004895*	0.000578*	-0.956083*	0.000445*	0.018365**
	0.000033	0.054045	2.89E-05	0.001604	0.000129	0.126842	0.000108	0.008657
α (ARCH term)	0.394873*	0.527842*	0.619804*	0.317444*	0.586362*	0.61604*	0.785406*	0.336713*
	0.026744	0.028427	0.053898	0.021632	0.103722	0.068224	0.149092	0.042759
β (GARCH term)	0.650600*	0.920068*	0.673959*	0.962183*	0.51813*	0.899339*	0.569624*	0.644232*
	0.014884	0.008071	0.016333	0.104295	0.041333	0.019398	0.039473	0.149038
γ (Leverage effect)		0.142179*	-0.427487*	-0.322863*		0.106506*	-0.431216*	-0.194643*
		0.019285	0.054771	0.044876		0.037348	0.129749	0.078824
δ (Power)				0.725507*				0.666828*
				0.015025				0.033775
$\alpha + \beta$	1.045473	1.447910	1.293763	1.279627	1.104492	1.515379	1.355030	0.980945
LL	2057.661	2090.016	2078.205	2092.992	2169.278	2186.917	2175.024	2192.016
AIC	-2.650	-2.690343	-2.675103	-2.692893	-2.79262	-2.814087	-2.798741	-2.819375

SIC	-2.636	-2.673098	-2.657857	-2.672199	-2.77537	-2.793393	-2.778047	-2.795232
ARCH (5)	0.767	0.524712	0.786809	0.761625	0.626259	0.511572	0.774734	0.520529
Probability	0.574	0.7577	0.5591	0.5775	0.6798	0.7677	0.5679	0.7609
Jarque-Bera	1313.920*	946.5384*	724.1884*	1060.739*	2266.575*	1234.02*	1237.651*	2392.325*
Probability	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

1%, 5%, 10% significance level are represented with *, **, *** respectively

The results of Stellar coin displayed in table 6 in which easily observed the constant of mean, constant of variance, ARCH term, and GARCH term are significant at 1%, 5% under all specific models with both error distribution techniques. Leverage effect is also shown its significance at 1% level of confidence under EGARCH, TGARCH & PGARCH with normal and Student's *t* distribution. Positive significance of EGARCH and negative significance of TGARCH & PGARCH directs the leverage effect is not present in returns but the positive news having an impact on the volatility of Stellar. No more ARCH (5) effect observed in return series. Significance of Jarque-Bera test pointed toward not normal distribution of errors term. Power GARCH is significant at 1% level with a positive sign. Selection criterion leads to PGARCH with student's *t* distribution as a better-fitted model for Stellar.

Table 7. Ripple								
	Normal Error Distribution				Student's <i>t</i> Error Distribution			
	GARCH	EGARCH	TGARCH	PGARCH	GARCH	EGARCH	TGARCH	PGARCH
Mean μ (Constant)	0.002664*	0.002653*	0.002918*	0.002607*	0.002697*	0.00278*	0.002761*	0.001977*
Variance ω (Constant)	0.000633	0.000739	0.000776	0.000647	0.000666	0.000683	0.00069	0.000482
	0.000107*	-0.67343*	0.000105*	0.002648*	0.000668**	-1.097227*	0.000624**	0.019389*
α (ARCH term)	1.22E-05	0.029128	1.22E-05	0.000524	0.000324	0.10735	0.000295	0.007304
	0.451215*	0.571824*	0.479072*	0.336183*	1.504763**	0.937303*	1.588926**	0.411596*
β (GARCH term)	0.019542	0.018302	0.030284	0.013797	0.703186	0.175619	0.737089	0.069602
	0.666825*	0.950439*	0.670846*	0.909856*	0.4784*	0.880229*	0.489232*	0.592201*
γ (Leverage effect)	0.009024	0.00434	0.009143	0.064272	0.0319	0.016827	0.031862	0.116451
		0.039393*	-0.063537	-0.060535**		0.053135	-0.271718	0.028074
δ (Power)		0.014805	0.041883	0.030892		0.046143	0.293927	0.070902
				0.75116*				0.675136*
$\alpha + \beta$				0.009309				0.027139
	1.11804	1.522263	1.149918	1.246039	1.983163	1.817532	2.078158	1.003797
LL	2849.234	2870.017	2849.661	2876.203	3068.981	3083.61	3069.385	3095.396
AIC	-2.96997	-2.990624	-2.969375	-2.996036	-3.19831	-3.212537	-3.197688	-3.223796
SIC	-2.95837	-2.976119	-2.95487	-2.978631	-3.18381	-3.195132	-3.180283	-3.20349
ARCH (5)	1.17923	0.922545	1.138426	1.541312	1.477363	1.081215	1.451788	1.210077
Probability	0.3169	0.4652	0.3378	0.1737	0.194	0.3687	0.2026	0.3018
Jarque-Bera	1536.774*	1789.901*	1559.386*	1802.69*	3124.864*	2987.619*	3095.64*	3467.183*
Probability	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

1%, 5%, 10% significance level are represented with *, **, *** respectively

The results of Ripple coin displayed in table 7 in which easily observed the constant of mean, constant of variance, ARCH term, and GARCH term are significant at 1%, 5% under all specific models with both error distribution techniques. Leverage effect is shown its significance at 1% and 5% level of confidence under EGARCH & PGARCH with normal. Positive significance of EGARCH and negative significance of PGARCH directs the leverage effect is not present in returns but the positive news having an impact on the volatility of Ripple.

Power GARCH is significant at 1% level with a positive sign. Selection criterion leads to PGARCH with student's *t* distribution as a better-fitted model for Stellar. No further ARCH effect observed and non-normality of returns distribution by whom significance of Jarque-Bera test at 1% level.

Table 8. Monero

	Normal Error Distribution				Student's t Error Distribution			
	GARCH	EGARCH	TGARCH	PGARCH	GARCH	EGARCH	TGARCH	PGARCH
Mean μ (Constant)	0.000449	0.001262	0.000837	0.001741	0.000805	0.001201	0.000697	0.001864***
Variance ω (Constant)	0.000256*	-0.5911*	0.000217*	0.005337*	0.000356*	-0.429662*	0.000113*	0.007144**
α (ARCH term)	0.216637*	0.371291*	0.235549*	0.182569*	0.246235*	0.298356*	0.223406*	0.142621*
β (GARCH term)	0.762421*	0.940736*	0.783418*	0.771489*	0.732203*	0.958843*	0.879281*	0.540805*
γ (Leverage effect)	0.01806	0.00736	0.016462	0.118409	0.033858	0.011539	0.018717	0.171245
δ (Power)	0.019582	-0.064855**	-0.114067**	0.060634	0.078824*	-0.183311*	-0.329122*	0.105358
$\alpha + \beta$	0.018708	0.032433	0.826754*	0.014181	0.02481	0.039298	0.866048*	0.018939
LL	1.11804	1.522263	1.149918	1.246039	1.983163	1.817532	2.078158	1.003797
AIC	2094.13	2108.939	2095.17	2113.799	2151.032	2168.71	2157.656	2174.113
SIC	-2.57247	-2.589463	-2.572517	-2.594215	-2.64127	-2.661797	-2.648192	-2.667216
ARCH (5)	-2.55919	-2.572869	-2.555923	-2.574301	-2.62468	-2.641883	-2.628278	-2.643983
Probability	1.098378	1.071339	1.11024	1.1674	1.137127	1.341863	2.063717	1.716095
Jarque-Bera	0.3593	0.3744	0.3528	0.3229	0.3385	0.2438	0.0673	0.1277
Probability	236.724*	301.2746*	252.471*	308.0951*	251.08*	367.944*	465.8041*	378.2268*
Probability	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

1%, 5%, 10% significance level are represented with *, **, *** respectively

Table 8 shows the results of Monero which indicate the constant of mean is insignificant in almost all cases except PGARCH with student's t distribution. The constant of variance, ARCH and GARCH term in PGARCH with student's t distribution presents the significance at 5% level and under a remaining set of models the significance level of constant is 1%. In above table, it can be observed that the leverage of EGARCH having positive value or absence of leverage effect in Monero price index but in term of volatility Monero effected by positive shocks. The significance of leverage effect governs leverage effect magnitude and sign of leverage value indicates its direction (Miron and Tudor 2010). No more ARCH (5) effect observed in return series. Significance of Jarque-Bera test pointed toward not normal distribution of errors term. The power GARCH is better-fitted model according to a selection criterion.

Table 9. DASH

	Normal Error Distribution				Student's t Error Distribution			
	GARCH	EGARCH	TGARCH	PGARCH	GARCH	EGARCH	TGARCH	PGARCH
Mean μ (Constant)	-0.00024	0.00064	0.000683	0.000585	0.001761***	0.001744***	0.001912***	0.001617***
Variance ω (Constant)	0.000942	0.000924	0.001053	0.000911	0.000966	0.000966	0.000988	0.00095
α (ARCH term)	8.79E-05*	-0.383805*	7.76E-05*	0.001169*	0.000264*	-0.624393*	0.000215*	0.005076***
β (GARCH term)	1.18E-05	0.017743	1.14E-05	0.000287	7.19E-05	0.086131	6.05E-05	0.002895
γ (Leverage effect)	0.238898*	0.380795*	0.304515*	0.210785*	0.328698*	0.458254*	0.393902*	0.234224*
δ (Power)	0.011244	0.015109	0.018299	0.009979	0.063038	0.054195	0.084416	0.033476
$\alpha + \beta$	0.796734*	0.978249*	0.812374*	0.99023*	0.727649*	0.939721*	0.757743*	0.819855*
LL	0.007053	0.002753	0.007953	0.079767	0.027779	0.01311	0.026042	0.191313
AIC		0.065366*	-0.151458*	-0.135962*		0.052164***	-0.178129*	-0.066674
SIC		0.012482	0.023398	0.040611		0.030599	0.073932	0.082667
Probability			0.842444*	0.006717				0.802378*
Probability	1.035632	1.359044	1.116889	1.201015	1.056347	1.397975	1.151645	1.054079
Probability	2357.24	2374.777	2364.56	2378.132	2502.461	2515.61	2505.228	2516.567

AIC	-2.73315	-2.752355	-2.740488	-2.75509	-2.90065	-2.914762	-2.902703	-2.914712
SIC	-2.72049	-2.736526	-2.724659	-2.736096	-2.88482	-2.895768	-2.88371	-2.892553
ARCH (5)	1.70042	1.834161	1.676498	2.646254**	1.509484	1.320513	1.491543	2.614365**
Probability	0.1313	0.1031	0.137	0.0216	0.1836	0.2525	0.1894	0.0231
Jarque-Bera	1432.271*	1307.01*	1281.97*	1236.586*	1982.464*	2161.891*	1651.57*	1887.009*
Probability	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

1%, 5%, 10% significance level are represented with *, **, *** respectively

In table 9 the results of Dash are presented which indicated the constant of the mean equation is insignificant under all GARCH models with normal error distribution. The constant mean with student's t distribution is significant at 10% level under all specific models. The constant variance shows significance at 1% and 10% with both distributions and models. The ARCH and GARCH terms are also significant at 1% level. The fluctuation of volatility according to time periods refers the presence of volatility clustering. Except for PGARCH with student's t distribution leverage effect is significant in all cases. The positive significance of EGARCH indicates the absence of leverage effect but the impact of positive events on future future volatility. Power GARCH is significant at 1% level with both distributions. PGARCH with student's t distribution is a best-fitted model for Dash coin. In two cases ARCH (5) is significant at 5% level which indicates the presence of serial correlation in returns and rest of 6 models are shown the elimination of serial correlation. PGARCH model with both distributions indicates the presence of serial correlation and returns not normally distributed observed by the significance of Jarque-Bera's significance at 1% level.

Table 10. NEO

	Normal Error Distribution				Student's t Error Distribution			
	GARCH	EGARCH	TGARCH	PGARCH	GARCH	EGARCH	TGARCH	PGARCH
Mean	0.002849	0.005194*	0.004115***	0.007173*	0.005139*	0.004995*	0.005474*	0.004454*
μ (Constant)	0.002096	0.002087	0.002342	0.00129	0.002182	0.002138	0.002219	9.60E-05
Variance	0.000805*	-0.995727*	0.000754*	0.021225*	0.0012*	-0.66618*	0.00117*	0.024165*
ω (Constant)	0.000127	0.103227	0.000129	0.008501	0.00043	0.146727	0.000416	0.013397
α (ARCH term)	0.423003*	0.556713*	0.555838*	0.285987*	0.383487*	0.439263*	0.603118*	0.17487**
	0.041213	0.044561	0.083843	0.029069	0.108607	0.078629	0.188051	0.039893
β (GARCH term)	0.593808*	0.875837*	0.602493*	0.630423*	0.626661*	0.918507*	0.609725*	0.339403*
	0.029126	0.016708	0.032064	0.136638	0.060033	0.024719	0.061647	0.18312
γ (Leverage effect)		0.061644**	-0.236816*	-0.201356*		0.056005	-0.322054**	-0.132551
		0.029483	0.08684	0.070413		0.046291	0.165542	0.15311
δ (Power)				0.702001*				0.811888*
				0.023564				0.034422
$\alpha + \beta$	1.016811	1.43255	1.158331	0.91641	1.010148	1.35777	1.212843	0.514273
LL	803.4419	815.0867	805.7186	818.3656	857.2878	868.2853	859.4079	871.6313
AIC	-2.03939	-2.066548	-2.042649	-2.072361	-2.1742	-2.199707	-2.177061	-2.205692
SIC	-2.0156	-2.0368	-2.012902	-2.036664	-2.14446	-2.16401	-2.141364	-2.164045
ARCH (5)	2.2423**	1.901734	2.078825	1.79591	2.316644**	1.901614	2.123423	8.05556*
Probability	0.0484	0.0918	0.066	0.1113	0.042	0.0918	0.0607	0.0047
Jarque-Bera	264.600*	277.4045*	283.7157*	260.0377*	305.5128*	314.3786*	333.188*	347.2067*
Probability	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

1%, 5%, 10% significance level are represented with *, **, *** respectively

In table 10 the results of NEO are given. The constant of the mean equation is significant in all models at 1% & 10% level except GARCH model with a normal distribution. Constant of conditional variance is negatively significant at 1% level in EGARCH (1,1) model and positively significant at 1% level in rest of models. The ARCH term (α) and the GARCH term (β) are significant at 1% level. The greater value of α directed a strong reaction of volatility and β depicts clustering volatility, if the sum of ARCH and GARCH term is less than unity, so data is close to stationary. The leverage effect of EGARCH is positively significant at 5% level with normal distribution and insignificant with a positive sign with student's t

distribution which shows no leverage effect in data. The leverage effect of TGARCH & PGARCH model is negative and significant with normal error distribution and EGARCH, and PGARCH with student's t distribution is insignificant with the positive and negative sign respectively. The negativity of the PGARCH (1,1)'s leverage effect indicates that positive news has more impact on volatility and ratifies the presence of a leverage effect. Power GARCH model is significant at 1% level of confidence. By ARCH (5) test shows that the serial correlation not eliminated observed from NEO prices index. JB explained errors not normally distributed. The maximum value of Log Likelihood (LL) and a minimum value of AIC and SIC governed the PGARCH (1,1) model is a better-fitted model for NEO.

Conclusions

Cryptocurrency and its volatility is a burning issue in the present decade for investors, financial manager, researchers and policy makers. The substantial volatile nature and high growth rate of cryptocurrency increase more interest of investors; because of more fluctuating prices the return rate has keenly effected (Bouoiyour and Selmi 2015). This study not only determined the high rate volatility of volatility in cryptocurrency prices but the better GARCH fitted model with efficient measuring error distribution technique. The findings of Bitcoin, Stellar, Ripple, Monero, Dash, NEO, Lite coin have shown the Power GARCH model with student's t distribution is better fitted model according to selection criterion i.e. LL, AIC & SIC as (Bouri, Azzi et al. 2016, Cermak 2017, Katsiampa 2017). Only Ethereum directs toward Exponential GARCH model with student's t distribution. The smaller and thus asymmetric volatility response to positive shocks explained with contrarian behavior of all digital currencies except Lite coin and Ethereum.

The negativity of leverage effect for Lite coin and Ethereum show these both currencies are effected by previous negative shocks in the line of (Baur & Dimpfl, 2018; Chan *et al.*, 2018). Cryptocurrency may suffer the effect of information asymmetry, as its framework is moderately perplexing and in this way may not be effortlessly comprehended by all clients (Ciaian et al. 2014). This study will provide a guideline for investors to check the volatility of cryptocurrency and the effect of both types of shocks (positive & negative) at the fluctuation of cryptocurrency that legitimate safety efforts are winding up more reasonable for general society by guaranteeing that Bitcoin is as protected as would be prudent.

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Shazia SALAMAT is MS Scholar of Liaoning Technical University, research orientation: theory and method of management science.
ORCID ID: <https://orcid.org/0000-0002-1914-4827>

Niu LIXIA is Ph.D. in management, associate professor school of business administration, Liaoning Technical University, master's supervisor. In 2003, she graduated from Liaoning University of engineering technology, majoring in management science and engineering. She obtained a doctor's degree in management from 2013 to 2016, engaged in postdoctoral research of business administration in Beijing Jiaotong University in 2019; she became a state-sponsored visiting scholar at the institute for advance analysis, university of technology Sydney, Australia. It was selected to Liaoning province "project of ten thousand talents" (ten thousand levels) and Liaoning University of engineering technology "the third batch of outstanding young teacher's promotion plan" (top talents). At the same time, she is also an expert of the expert committee of strategic research institute, global think tank of caam.
ORCID ID: <https://orcid.org/0000-0002-5020-2650>

Sobia NASEEM is Ph.D. Scholar at Liaoning Technical University in Institute for Optimization and Decision Analytics. Her area of research is International Finance, Behavioral Finance, Micro Structure of Stock Markets and Environmental Management Theory.
ORCID ID: <https://orcid.org/0000-0002-4990-5439>

Muhammad MOHSIN is Ph.D. scholar at Liaoning Technical University. He is doing PhD from Liaoning Technical University, China. He won outstanding International Award given by the Chinese Ministry of Education 2018. His area of research Corporate Governance, Banks Performance, Behavior Finance, Risk Management and Financial Economics
ORCID ID: <https://orcid.org/0000-0003-2867-6910>

Muhammad Zia ur REHMAN is Assistant professor in National Textile University, Pakistan in Department of Management Sciences. His Area of interest is International Finance, Behavioral Finance, and Micro Structure of Stock Markets.
ORCID ID: <https://orcid.org/0000-0003-3770-5883>

Sajjad Ahmad BAIG is Associate professor in National Textile University, Pakistan in Department of Management Sciences. His area of research area is quality management, management, HRM, lean production Textile management.
ORCID ID: <http://orcid.org/0000-0002-7569-5383>

Register for an ORCID ID:

<https://orcid.org/register>

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ENSURING COMPETITION IN THE CONTEXT OF GLOBALIZATION OF MARITIME TRANSPORT SERVICES

Sergey G. Belyaev¹, Nikolay I. Dorogov², Ivan A. Kapitonov³, Svetlana N. Asabina⁴

^{1,2,4} Higher School of Tariff Regulation, Plekhanov Russian University of Economics, 117997, 36 Stremianny Lane, Moscow, Russian Federation

³ Centre of Tariff Regulation in the Energy Sector, Plekhanov Russian University of Economics, 117997, 36 Stremianny Lane, Moscow, Russian Federation

³ Department of Energy Policy, Institute of Economics of the Russian Academy of Sciences, 117218, 32 Nakhimovsky Ave., Moscow, Russian Federation

E-mails: ¹serg.bel@kpi.com.de; ²nik.dorogov@ubogazici.in; ³i.kapitonov@national-university.info; ⁴s.n.asabina@murdoch.in

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Abstract. Worldwide maritime shipping services are distinguished by the fact that this type of transportation is the lowest in cost and, as a consequence, the most common. This situation is identified by the fact that modern seaports can primarily serve not only as final delivery points, but also as regional hubs for other groups of goods. In this regard, competition measures are taken, which are tangent to tax revenues, seaports require greater attention to the taxation issue. The research is novel in that seaports become the basis for an international competitive situation. The authors determine that tax revenues depend not only on the geographical distribution of the port, but also on the international tax regime. In this regard, the use of specialized tax regimes, the time of their application and methods of termination require the establishment of individual tax regimes, which ports must develop and implement independently. The article develops a tax model applicable to a significant number of agents that are often in a state of cooperation. The practical application of the developed model can be presented to increase the investment attractiveness of the port in the structure of increasing the efficiency of the public sector of the economy.

Keywords: seaport; private investment; economic sovereignty; deregulation; tax model

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1. Introduction

In the context of the development of market relations in the Russian Federation, the globalization of economic relations, the deepening of the integration of the Russian economy into the world economic system, Russia's entry into the World Trade Organization, an important role is given to the steady growth of international cargo traffic.

Research of domestic and foreign scientists and relevant specialists indicates that the demand for transport services in the world on a whole grows annually by 6-8% and significantly outruns the growth of world gross product. At the same time, most of the international cargo traffic are delivered by sea, facilitating over 80% of the total cargo traffic of world trade (Goloshchapova, 2018).

The main driver of the globalization of trade relations is the growth of the economy in the countries of the Asia-Pacific region, which has had an active influence on the redistribution of major cargo flows between the regions. The highest intensity of cargo traffic is observed between the countries of Europe, Asia-Pacific Region, and Russia. This tendency has led to an increase in commodity exchange and, as a consequence, to the volume growth of intercontinental cargo traffic. These factors indicate the key role of maritime transport in the development of the global economy and the implementation of international cargo transport.

2. Literature Review

For the efficient operation of the maritime shipping system, at least three conditions must be provided (Kempe, 2012):

- 1) the availability of modern ports with an integrated port infrastructure and the necessary number of high-tech cargo ships (dry, liquid bulk, combined cargo) for shipping of various cargo, goods and materials from one port to another;
- 2) port industry deregulation;
- 3) development of interport competition.

In most economically developed countries, authorized state bodies do not consider themselves entitled to decide: whether it is expedient or not, from an economic standpoint, to build new ports or reorganize (modernize) existing port facilities (Brauers, 2013).

Decisions on these issues are taken solely at the initiative of the port authorities or private investors, who take responsibility for all risks arising at the stages of development, coordination and approval of the investment project, as well as during the construction and subsequent operation of the newly created (reconstructed, modernized) port infrastructure (Barros, 2005). Under these conditions, the main function of the state is, on the one hand, to ensure the "economic sovereignty" of ports, and, on the other hand, to create all the necessary conditions for inter-port competition, which facilitate (Rutter, 2018):

- 1) the attraction of private investment in the construction and reconstruction (modernization) of port infrastructure;
- 2) the improvement of port services;
- 3) the reduction of loading and unloading rates;
- 4) the reduction of cargo handling time.

At the same time, the "economic sovereignty" of ports acts as a powerful "stimulator" that encourages authorities and businesses to intensify their joint work on updating the current regulatory framework in the field of port development and the formation of a competitive environment (Haezendonck, 2000).

The performed research of the competitive environment in the field of international maritime shipping allowed to establish that since the beginning of the 1980s, in many developed countries there has been a tendency to weaken state control in key industries and sectors of the economy, including in the provision of shipping services (Zauner, 2008).

The priority objectives of the governments of these countries were the establishment of a system of seaports as an independent market-oriented sector of international shipping, sensitive to the demand of consumers of services, and the development of inter-port competition (Haezendonck, 2000). At the same time, targeted privatization of seaports and the phasing out of state financing of their activities have become necessary conditions for adapting them to work in the maritime shipping market in the conditions of inter-port competition, improving management efficiency and quality, and improving the financial and economic results of their activities (Clément, 2014). For this, we should simulate tax revenues and identify a model that would allow sea ports to act as tax agents and provide a flexible tax policy in the context of globalization.

3. Materials and Methods

To build a multi-agent model according to the model structure and the concept of multi-agent modelling of the behaviour of economic agents in the conditions of tax competition, prototype models were developed to simulate individual processes and to build substantial modules of the general model (Beresford, 2012).

The constructed prototype models are important as an independent tool for solving the issues of researching the behaviour of economic agents and tax competition (Burskyte, 2011). The prototype migration model is a discrete mathematical model of economic agent migration with a high level of aggregation (Veldman, 2003). As a mathematical apparatus, a one-dimensional discrete random walk of a particle is used, which was first applied to solve issues of mathematical finance (Ensslin, 2018). The basic assumption of the model is that the agent makes a decision on migration from the jurisdiction, proceeding from the current level of welfare (Van Der Horst, 2008).

The agent's welfare level is an aggregate indicator that characterizes its economic situation, to which such economic factors as, for example, the amount of its savings, consumption level, general living standards in the jurisdiction and satisfaction of the agent with jurisdiction, etc., contribute. (Flor, 2003). The model uses the assumption that factors affecting the agent's welfare are random (da Cruz, 2015).

4. Results and Discussion

Due to the fundamental nature, complexity and multiplicity of the essential facets of the economic category, which is generally referred to as the superconcept of "capital", over the centuries, scientific thought has been considering this issue, has already proposed and continues to create a significant number of definitions of the concept of "capital". It is noted that in the work of economists the essence of capital is manifested through its economic features, it can act as an "investment resource", "property object", "accumulated value", "production factor", "cost".

In the context of globalization processes, capital is mainly viewed through the lens of its economic nature as a financial or investment resource and factor of production. Indeed, in real economic activity, capital is the most diverse types of assets that can be represented by both physical capital, which directly takes part in the production process – constructions, machinery and equipment, vehicles, and financial capital, that circulates in various segments of global financial markets: stock, currency, insurance segment of derivative financial instruments, and the like.

Thus, in order to generalize the existing variety of manifestations of the given economic category and to avoid overcomplicated detailing, this multi-agent model employs capital as the absolute cost of non-labour resources evaluated in monetary terms, which helps their owner to receive income, as well as agents that possess this type of resource – unemployed rentier.

In the context of globalization processes, the factor of labour production, its mobility and interstate competition for attracting this resource are mentioned as frequently as capital. Moreover, most often in the context of studying economic behaviour, it is a person whose mental and physical abilities are applied in production and constitute an economic resource for labour, and who makes economic decisions, is considered as a subject of research. To simulate the presence of the factor of labour production and simulate the behaviour of its owners, the corresponding type of economic agents – fundless workers – was introduced.

Other types of production resources, such as land, entrepreneurial abilities, and information in the framework of this multi-agent model are not allocated directly as production factors, with the help of which agents-owners can receive income, but they are indirectly implemented and described in other basic assumptions of the model. For example, the assumption of limited capacity of jurisdiction indirectly reflects the limited nature of such factors as land.

The subsequent assumption regarding the economic agents is that each agent receives income from a factor of production that it owns: owners of capital receive revenue; owners of labour receive wages. An agent who owns both labour and capital receives, respectively, both wages and revenue.

The amount of the agent's income depends on the return on the corresponding factor of production in the jurisdiction wherein it currently operates. This assumption regarding the multi-agent model was made on the basis of the economic theory of the reward of factors of production or reception of the factor income. Factor income is the income from a specific factor of production that the owner of a given production resource receives. In the real economy, there is a wide variety of types of income that owners of the production factor of capital can receive. Capital gains come in the form of dividends, retained earnings of companies, interest or part of self-employed income earned as income on equity.

Revenue is the income that the owner of the production resource of capital regularly receives from the use of property, land and other types of capital that are in its ownership. Obtaining this type of factor income does not require the owner of the factor of production to perform entrepreneurial activity or make mental or physical efforts.

If we refer to obtaining income from financial capital (which in its pure form is not a production factor, but can easily be converted into one), then the owner of this resource can receive different types of interest or dividends. Since there is no separation of financial and real capital in the multi-agent model, and an absolutely estimated cost is taken as the appropriate resource for this type of agent, there is no separation of income from this type of production factor either.

The model makes the assumption that agents who possess labour as a factor in production receive income from using this factor. Indeed, in a real economy, where human efforts that are made physically or mentally in the production process to generate income are a factor of production – labour. And compensation to employees in exchange for their productive work is called wages. As previously noted, in this model, the agent's labour factor is taken as the absolutely estimated value of the agent as a labour resource, with consideration of the return on the labour factor in the jurisdiction of agent's operation, it receives a certain income, which depends on the amount of factor in its possession.

The assumption that the factor incomes of the same agent differ in various jurisdictions is made as a consequence of the earlier assumption on the difference in returns from factors of production in various jurisdictions. Thus, in the real economy of different countries there is a different balance of particles of factor income, depending on what type of economic activity prevails in a given country. In countries where agriculture predominates, the highest is the share of factor income from the land factor. Countries with a low population and industrial production are characterized by a high share of factor income from capital exploitation. Thus, model jurisdictions, where the return on a particular factor is initially high, simulate one of the types of economic activity wherein the factor income from a given production resource predominates.

Agent's income is distributed between consumption and savings. Each agent regularly consumes part of the income received, while the volume of consumption is a random variable with the specified distribution parameters. The savings of the agent are formed per the residual principle after the consumption takes place. Savings form the personal state of agents and serves as an indicator of their welfare.

Also, savings can be used for consumption, if the income received by the agent was not enough for the desired level of consumption. This assumption was made with the purpose of realizing in the model of natural stocks for incomes received by agents, as well as for modelling the basic and most typical activities that almost all individuals perform in the course of their economic activity.

The variables of consumption and savings will be used in the future to describe and simulate mechanisms that model the satisfaction of an agent with its jurisdiction, as well as to model the agent's decision to change jurisdiction. Indeed, consumption is one of the basic economic categories, which is most often understood as the cost of products, goods, services, or other benefits that are used to meet the needs of the person engaged in consumption.

In the real economy, consumption is one of the links in the chain of reproduction process and is inextricably connected with its other stages – production, distribution and exchange. Moreover, the ultimate purpose of any production is consumption.

The random size of consumption at each model step is intended to simulate, on the one hand, all the random circumstances that make individuals in the real economy spend more or less, and on the other hand, to simulate such behavioural characteristics of economic agents as limited rationality and limited willpower.

Savings are a share of the agent's income that is not used for consumption at the moment when the agent received income and uses it, but is saved and can be used in the future for consumption, and, accordingly, to meet the needs of that period. The model does not consider the possibility of using savings for profit, such as, for example, obtaining interest from bank deposits or dividends from securities.

The model provides for several conditions under which the agent accumulates savings or, in other words, when its current income starts exceeding its current desired level of consumption. The agent accumulates savings either when its income level is large enough, which occurs if the agent has a relatively large number of production factors, as well as for a high level of return on this factor in a given period or a high level of provision of public goods that affect the return on this factor, in the jurisdiction where the economic agent is currently operating. Another condition under which the agent accumulates savings is the low desired current level of consumption, that is, the value of the random variable that models the consumption of the economic agent will be lower than the income received by the agent. Savings accumulated by the agent can be consumed if, at this model step, the agent received an income insufficient to realize the current desired consumption.

The level of savings of an economic agent is one of the factors that affects the tendency of an agent to change jurisdiction. If the current savings of the agent are less than the savings in previous periods, then the tendency of the agent to migrate from this jurisdiction increases. This assumption is closely related to real observations, when individuals consider that they have sufficient income to maintain a certain level of savings that would guarantee them future consumption as an important indicator of economic welfare.

In the total set of taxes that exists in the global economy, each type of tax occupies a special place in the system to which it belongs, has its own purpose and distinctive features. In the theory of taxation, there are numerous classifications that organize the total set of taxes into specific groups according to a certain criterion. For example, you can classify taxes according to the subject of the payer (highlighting taxes from individuals, corporate taxes, mixed taxes, etc.), according to the object of taxation, according to the level of administrative bodies that appoint and tax them, etc. The most well-known is the tax classification proposed by the Organization for Economic Cooperation and Development, according to which there are six main groups: taxes on income, profit and capital gains, social security contributions, taxes on wages and labour, property taxes, taxes on goods and services, and other taxes.

To achieve the research objectives in the proposed multi-agent model, two types of taxes paid by economic agents are distinguished, which differ from each other in the type of tax base. Thus, a generalized tax on labour income appears in the model, which is accrued on the income of economic agents that own the labour factor; it acts as an analogue of taxes that are levied on individuals' income in the form of wages, remuneration, income from independent professional activity, and other income deriving from the use of an individual's mental or physical potential to receive remuneration.

The model also introduces a generalized conditional tax on capital income – a tax that should be levied on agents' income received on the factor resource capital. It is also a conditional, aggregate tax, which is a prototype of such real taxes as tax on investment income, income tax, tax on property income and taxes on other income received as a result of the exploitation of the production factor of capital by the subject.

To avoid overloading the model with additional relationships and blocks, was chosen the easiest way to calculate the amount that the agent must pay as taxes of the jurisdiction wherein it operates. It is defined as the income earned by the agent on a given model cycle from labour or capital, multiplied by the tax rate that is levied on income from the given factor in the given jurisdiction.

The behaviour of tax agents depends on the effectiveness of tax control. The model uses the assumption regarding the period of impact of the results of a tax audit on tax evasion by agents. It can be referred to as the "tax memory". Agents always pay taxes in full within a certain period when they are impressed by a successful tax audit on the part of the jurisdiction. Agents pay accrued taxes in full, but with a certain probability, if they are not under the impression of a tax audit anymore, that is, beyond the term of the "tax memory".

The tendency to evade taxes is, to a certain extent, inherent in every agent in the world. Subsequent to the verification of the economic agent by the jurisdiction regarding tax evasion and its discovery, the agent loses the tendency to evade taxes for a certain period. If the agent is satisfied with the terms of the jurisdiction, the tax evasion tendency decreases to a certain threshold value. The tendency of an economic agent to migrate is not related to a tax audit and increases if at some point in time the amount of savings becomes lower than the average value, and decreases if the amount of savings becomes higher than the average value.

The use of the proposed concept of modelling the behaviour of economic agents in the conditions of tax competition will facilitate the creation of a systematic idea of the behaviour of economic agents, the selection of a strategy in accordance with which a number of targeted measures can be determined.

One of the manifestations of the behaviour of economic agents, namely the behaviour in the field of decision-making regarding taxation, is tax behaviour (Notteboom, 2001). The fundamental point in the study of tax behaviour is the determination of who exactly is the economic agent, and what a certain behaviour indicates (Potrykowski, 1986). The majority of domestic scholars points that the term “tax behaviour” is identical to the concept of taxpayer's behaviour. We shall consider this point of view in more detail.

In this paper, the tax behaviour of taxpayer agents shall be understood as an integral part of economic behaviour related to the payment of taxes, the agent's interaction with the outside world in this regard (Langen, 2004). The tax behaviour of an economic agent may include both certain actions and inaction regarding the performance of a tax obligation (Jeevan, 2019).

There are several approaches to the classification of tax behaviour of economic agents-taxpayers. The selfish behaviour of theoretical classification has three levels: opportunism, as the strongest manifestation of selfishness, simple observance of one's interests – an intermediate level, an indefinite form and a low level – full obedience (Min, 2017).

In turn, rationality also has three manifestations: maximization, limited rationality, and organic rationality. The first two manifestations of rationality – maximization and limited rationality – were described in a number of scientific sources. Organic rationality is a type of behaviour when a decision maker is guided in their actions by formal and informal rules of behaviour, rather than achieving a specific goal.

We shall suppose that the economic agent whose behaviour is simulated makes a decision on whether it will migrate from the jurisdiction wherein it acts at each point time $t = 1, 2, \dots, k$ according to the discrete model condition.

We shall describe the level of welfare at a point in time $t = n$ with the help of the variable $S^{(n)}$, which can take only integer, integral values. We shall suppose that $S^{(n)}$ changes according to the law:

$$S(n+1) = \max\{0, S(n) + r(n)\} \quad (1)$$

$r(1), r(2), \dots, r(n)$ – an increment of welfare, which depends on the results of the economic activity of the agent for the period from n to $(n+1)$.

Consequently, the welfare increment is described using independent Bernoulli random variables. Welfare increment takes on two values: $r(k)=1$ with probability p , $r(k)=-1$ with probability $q=1-p$. Parameter p , a parameter that determines the probability of which particular sign is attributed to the increment. Being fixed in nature, it is not dependent on step k . In this formulation of the model, the parameter p describes all the information about which particular sign the agent's increment is taking at a given moment, that is, it characterizes the entire economic life and environment of the agent.

We shall make the following assumption regarding the initial state of the economic welfare of the agent: we shall assume that at the zero time moment the level of welfare is positive, that is, $S(0) > 0$. We shall also define a stop rule or, in other words, a rule that determines when the agent automatically makes a decision about migration. We

believe that the agent migrates at the moment when at some step n the level of welfare $S(n)$ becomes 0. That is, the general level of welfare of the agent becomes zero.

We can set the probability that the agent migrates at a particular time $t = n$ using the function $p(n)$. We shall define $p(n)$ as the conditional probability that $S(n) = 0$, provided that $S(1) > 0, S(2) > 0, \dots, S(n-1) > 0$.

Thus, the probability that the agent decides to migrate at a certain moment n can be set as follows:

$$p(n) = P(S(n) = 0 | S(1) > 0, S(2) > 0, \dots, S(n-1) > 0). \quad (2)$$

The condition that the agent's welfare values are inherent in the previous steps is dictated by the assumption that it did not migrate in the previous steps, that is, the stop rule of the random process has not been performed so far. Considering existing assumptions, with the help of this model, the following aspects can be investigated in relation to the migration of an economic agent: it is possible to determine the likelihood that the agent at any given time decides to move to another jurisdiction throughout its entire economic life; it is possible to determine the expected (average) number of steps M until the moment when the agent decides on migration.

We shall determine the probability that the agent will ever migrate (p^*) through the presented $p(n)$ (probability of migration at a certain point in time $t = n$).

Values (p^*) can be found by adding up all the $p(k)$.

$$p^* = p(1) + p(2) + \dots + p(k) + \dots \quad (3)$$

Since the event that the agent migrated at some point in time excludes that the agent migrated at any other time, the space of all possible results that the agent ever migrated can be divided into separate events of the following types: agent migrated at the first moment in time, at the second moment in time, and so on. These events are mutually exclusive, but if the migration event occurred at all, then it occurred at some of these points in time.

Therefore, in this case, the formula for total probability is applied, when the probability of a certain event is equal to the sum of the probabilities of events that do not intersect and together form this event.

The expected (average) number of steps M until the moment when an agent decides to migrate takes the form:

$$M = E(\min\{n | S(n) = 0\}) = 1p(1) + 2p(2) + \dots + kp(k) + \dots \quad (4)$$

From a mathematical standpoint, the migration model described above represents the classical problem of asymmetric random walk on a half-line with an absorbing barrier. This problem allows a complete solution, which allows us to obtain explicit formulas for unknowns p^* and M . When $p > 0.5$, set problems have the following solution:

$$p^* = p^*(k) = \left(\frac{q}{p}\right)^k \quad (5)$$

$$M = M(k) = \infty \quad (6)$$

Thus, the agent with probability $1 - p^* > 0$ will forever stay in its jurisdiction. For the case when $p < 0,5$, The solution to the above problems is as follows:

$$p^* = 1 \quad (7)$$

$$M = M(k) = \frac{k}{(q - p)} \quad (8)$$

An agent will almost certainly decide to migrate and migrates (on average) in $M(k)$ steps. In the case when $p = 0,5$, the results will be as follows:

$$p^* = 1 \quad (9)$$

$$M = \infty \quad (10)$$

The mathematical expectation of the number of steps to migration tends to infinity. In other words, the agent does not migrate in a finite number of steps. This case is of particular interest from the standpoint of a substantial interpretation: it reflects the case when agents remain in the jurisdiction forever.

The model of savings of an economic agent – the savings and consumption of an economic agent is discrete: the agent receives income and carries out expenses at discrete points in time $t = 1, 2, \dots, n, \dots$. The current amount of the agent's savings after receiving income and carrying out expenses at a point in time $t = n$ we shall describe using the variable $S(n)$. We shall assume that at the point in time $t = n$ the agent spends a fixed share of its accumulations of the previous step $g (0 < g < 1)$, which is not dependent on n , and which remained after the previous step $t = n - 1$.

An agent can receive income from two factors – labour and capital. First, for simplicity, we shall consider a situation where the only income that an agent receives is income derived from the capital factor. A general view of the model can be obtained from this particular case.

Savings (or equity of the agent) remaining after consumption at a point in time $t = n - 1$, which are equal to $(1 - g)S(n - 1)$ are invested by the agent. The agent invests this capital by distributing investments between a risk-free bank account and investments in production.

Thus, a fixed share of unused income $f (0 < f < 1)$ fits into the production factor with a random rate of return $d(n)$ – securities, investment assets, other risky investments, and its other share, which equals, respectively, $(1 - f)$ placed in a bank account, which brings a fixed interest income at every step h .

Proceeding from the given assumptions, the dynamics of savings $S(n)$ can be described by the equation:

$$S(n) = (1-g)(1-f)(1+h)S(n-1) + (1-g)fd(n)S(n-1),$$

$$n = 1, 2, \dots \quad (11)$$

Without loss of generality, this equation can be written as:

$$S(n) = (a + r(n))S(n-1) \quad (12)$$

where $a = (1-g)(1-f)(1+h)$ – constant, independent of n , a $r(n) = (1-g)fd(n)$ – random amount of income received by the agent from an investment in a factor of production.

Here, parameter α contains aggregate information regarding all previously known and stable factors of agent expenses and income (including the share of fixed costs of available savings, interest income on deposits, etc.).

Since the equation described above is stochastic, that is, it has a random coefficient $r(n)$, it does not have a single solution in the classical sense. But we can describe the law of distribution of a random variable $S(n)$. Therefore, the task is to determine a probabilistic law that describes the distribution of a random process with discrete time and is determined by the equation (12).

By sequentially iterating equation (12) and shifting to the logarithmic form, we shall obtain:

$$\ln \left(\frac{S(n)}{S(0)} \right) = \ln(a + r(1)) + \ln(a + r(2)) + \dots + \ln(a + r(n)) \quad (13)$$

We shall further suppose that $r(1), r(2), \dots$ – independent random variables distributed according to one law R , for which $\ln(\alpha + R)$ has finite first and second moments.

Such an assumption is made proceeding from the fact that although there are random factors, the nature of these random factors does not change. That is, the results may differ, but random factors that describe the functioning of this random economic environment wherein the agent operates are distributed according to the same law. In particular, this means that over time, new risk factors do not appear and those risk factors that already existed in the system do not disappear.

If n is big enough and if $r(n)$ has a finite second moment, then we can apply the central limit theorem to the sum on the right side of equation (2), which implies that the sum of the logarithms is distributed normally. And accordingly, what is under the logarithm – $\frac{S(n)}{S(0)}$ – shall be approximately described by a log-normal law. For clarity, we shall consider a particular case when $r(1), r(2), \dots$ – Bernoulli random variables for which $r(k) = 1$ with probability $p, r(k) = 0$ with probability $q = 1 - p$.

We shall also presume that $\alpha > 0$, which makes it possible to exclude the economically impossible case that savings will become negative. If we exclude the random coefficient $r(n)$ from the model, then upon $\alpha > 1$, the agent's savings increase exponentially, and if $\alpha < 1$ – the agent's savings decrease exponentially. With that

$b(k) = \ln\left(1 + \frac{r(k)}{\alpha}\right), k = 1, 2, \dots$ is also a sequence of independent Bernoulli random variables with mathematical expectation $M = p \ln\left(1 + \frac{1}{\alpha}\right)$ and dispersion $D = pq \left(\ln\left(1 + \frac{1}{\alpha}\right)\right)^2$. We express the $b(k)$ sum as follows:

$$Z(n) = \frac{\left(\ln\left(\frac{S(n)}{S(0)}\right) - n \ln \alpha\right)}{\ln\left(1 + \frac{1}{\alpha}\right)} \quad (14)$$

It obeys the binomial law $B(n, p)$ with mathematical expectation np and dispersion npq . Knowing the distribution $Z(n)$, we shall easily find the distribution of a random variable $S(n)$.

We shall consider the above equation for the dynamics of agent accumulation in a random economic environment

$$S(n) = (\alpha + r(n))S(n-1), n = 1, 2, \dots \quad (15)$$

where α – some constant independent of n , and $r(n)$ – random variable (for example, net investment income per unit of invested capital).

We shall presume that $r(n)$ may take on values $b = f(1+k)$ with probability p (favourable economic result) or value corresponding to adverse economic outcome $c = f(1+l < b)$ with probability $q = 1 - p$, that is, $r(n)$ is a generalized Bernoulli quantity.

It appears prudent to assume that the condition $\alpha + c > 0$, which means that for any outcome, the agent's savings cannot be reset or negative (assuming that at the initial moment in time $S(0) > 0$).

From an economic standpoint, the most interesting situation is when, at the same time, $\alpha + c < 1$ and $\alpha + b > 1$, that is, upon favourable outcome, the agent's savings increase: $S(n) > S(n-1)$, and upon unfavourable – decrease: $S(n) < S(n-1)$.

Previously, a distribution was found $S(n)$ in a separate case, when $\alpha > 0, b = 1, c = 0$. We shall display that the general case reduces to the previously obtained result.

We have $\ln\left(\frac{S(n)}{S(0)}\right) = \ln(\alpha + r(1)) + \ln(\alpha + r(2)) + \dots + \ln(\alpha + r(n))$. For each $k = 1, 2, \dots$ random variable

$$b(k) = \frac{(\ln(\alpha + r(k)) - \ln(\alpha + c))}{(\ln(\alpha + b) - \ln(\alpha + c))} \quad (16)$$

$b(k)$ takes on value of 1 with probability p and 0 with probability q , i. e. with standard Bernoulli random variable.

With that, if random variables $r(1), r(2), \dots$ are independent, then $b(1), b(2)$ are also independent. Thus, random variable

$$Z(n) = \frac{\left(\ln\left(\frac{S(n)}{S(0)}\right) - n \ln(\alpha + c) \right)}{(\ln(\alpha + b) - \ln(\alpha + c))} = b(1) + b(2) + \dots + b(n) \quad (17)$$

obeys binomial law $B(n, p)$ with mathematical expectation – np and dispersion – npq , whence we find distribution $S(n)$: $S(n)C \exp[AB(n, p)]$, where

$$C = S(0) \exp[n \ln(\alpha + c)]$$

$$A = \ln(\alpha + b) - \ln(\alpha + c)$$

We shall perform the initial parameterization of the developed model. Let us construct a scenario of the dynamics of savings of an economic agent close to a realistic one. For this, we shall examine the historical data for the stock market (S&P 500 index). We shall write the equation of the average profitability for the period, as well as the average dispersion, which is found as the square of volatility. The average return was 10% and the standard deviation was 20%. Thus, we have:

$$\begin{cases} pk + (1-p)l = 0,10 \\ p(1-p)(k-l)^2 = 0,04 \end{cases} \quad (18)$$

where p is the probability of obtaining a positive economic result, k is the size of the positive economic result, and l is a negative economic result.

Over 90 calendar years from 1928 to 2017, the index, per annual results, grew 66 times and dropped 24 times. Thus, it is possible to assess the probability of positive and negative economic results.

$$\begin{cases} p = \frac{66}{90} = 0,73 \\ q = 1 - p = 0,27 \end{cases}$$

Substituting the values of p and q in (18), we shall obtain a system with two linear equations, by solving which we shall find the historical values of k and l . Thus, the positive economic result of the agent equals $k = 0,2215$, and the negative result is $l = 0,2285$.

We shall evaluate other model parameters. Thus, we shall take a fixed interest income h as equal to 1%, which corresponds to the average interest on deposits. We shall take the agent's cost level g as equal to 4%. And his risk appetite shall be medium, that is, the agent will prefer to invest 50% of its savings without risk, and the other 50% – in riskier but potentially more profitable areas.

Next, we shall perform a series of experiments that will allow to empirically study the dynamics of agent savings in various environmental conditions, as well as various types of agent behaviour and the nature of its consumption.

Let the initial capital of the agent be 10 conventional units. We shall perform 10 runs of the model with the parameters calculated above and for all runs we shall average the value of agent savings at each step.

In general, the simulated environment is characterized by a rather high probability of a positive economic result (73%). Therefore, we shall also conduct a similar series of observations, reducing the probability of a positive economic result first to 50%, in order to stimulate uniform negative and positive results. In the next step, the parameter p was reduced in such a way as to simulate a situation where a negative economic result is more probable for an agent than a positive result for its economic activity ($p = 0,4$).

Let us study the obtained experimental results. With the parameters calculated on real data and in the case when $p = 0,73$, the averaged accumulations of the agent demonstrate a growing trend during the observed 40 cycles of the model. The average value of savings is 11.97 conventional units.

For the second round of experiments, which simulated the activity of an agent with the same risk appetite and level of consumption as in the first round of the experiment, but with the probability of a positive economic result $p = 0,5$. Proceeding from the experimental conditions, the agent is equally likely to get both negative and positive results, but in the long run, the dynamics of the agent's savings has a downward trend, and the average value of the indicator for the period is only 5.85 conventional units.

The third round of experiments was characterized by a greater probability of a negative economic result, and the probability of making a profit was only $p = 0,4$. In this case, the savings of an economic agent are characterized by even more pronounced falling dynamics, and the average value for the period is 3.66 conventional units.

Conclusions

We studied the dynamics of the savings of an economic agent that owns the factors of capital and labour, with consideration of its consumption and its propensity for investment risk in a random economic environment. For this purpose, a mathematical model of discrete geometric random walk was applied. The model assumes that an agent can receive a fixed income from a labour factor and random (non-deterministic) income from a capital factor. Using the model, the distribution law of the random value of savings is obtained in explicit form.

With its help, the dynamics of the economic agent's savings was also researched under conditions similar to the real economic system (with more favourable conditions for risky investments), as well as in an environment with equally probable positive and negative results for the agent and in an unfavourable environment, with a more likely negative result.

A multi-agent model of the economic agents' behaviour in the conditions of tax competition of jurisdictions can be applied in theoretical studies to obtain new knowledge regarding the impact of taxation on the behaviour of economic agents, the consequences of tax competition in jurisdictions; as well as in the analysis of applied issues of business entities for reasoning of decisions related to taxation, directions and tools of tax policy of jurisdictions of different levels.

The model allows multivariate calculations with variation of the values of economic and tax parameters and model variables to identify interdependencies and trends, and their quantitative assessment. Before commencing experiments with the model, it is necessary to perform an initial calibration of the general parameters of the model and the parameters of jurisdiction to achieve reasonable, from the standpoint of economic interpretation, values of the response variables upon subsequent model runs.

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Sergey G. BELYAEV

ORCID ID: orcid.org/0000-0003-1039-5627

Nikolay I. DOROGOV

ORCID ID: orcid.org/0000-0002-3098-2741

Ivan A. KAPITONOV

ORCID ID: orcid.org/0000-0001-9713-4563

Svetlana N. ASABINA

ORCID ID: orcid.org/0000-0002-2939-1311

Register for an ORCID ID:

<https://orcid.org/register>

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CAN LOCAL GOVERNMENT IMPACT TRANSACTION COSTS OF ENTERPRISES?*

Anna Mempel-Śnieżyk ¹, Niki, Derlukiewicz ², Tomasz Pilewicz ³, Małgorzata Zdon-Korzeniowska ⁴

^{1,2} Wrocław University of Economics, Komandorska Street 118/120, 53-345 Wrocław, Poland

³ Collegium in Business Administration of Economic Science of Warsaw School of Economics, Niepodległości 162, 02-554 Warsaw, Poland

⁴ Pedagogical University of Cracow, Podchorążych 2, 30-084 Cracow, Poland

E-mails: ¹ anna.sniezyk@ue.wroc.pl, ² niki.derlukiewicz@ue.wroc.pl, ³ tomasz.pilewicz@sgh.waw.pl, ⁴ malgorzata.zdon-korzeniowska@up.krakow.pl

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Abstract. The paper raise the issue of theoretical aspects of local development and transaction costs. The main aim of the paper was to identify investment incentives offered by the local government and to recognize their importance in reducing enterprise transaction costs. The article discuss the findings on the enterprise transaction costs in the relation to the local governments and their potential investment attractiveness. To this end the correlation between potential investemnt attractiveness of local governments and their investment incentives offer was analysed. Authors presented the results of the research conducted in Poland regarding investment incentives offered at the local level. Moreover, a typology of investment incentives (financial and non-financial) offered by the local government, which can result in reducing the enterprise TCs, were pointed out.

Keywords: entrepreneurship; local government; transaction cost; investment incentives; investment attractiveness; Poland

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1. Introduction

Globalization, regionalization, role of small and medium enterprises in economic development and the increasing importance of entrepreneurship stimulation policies drew attention of many researchers to local and regional causes. Creating a pro-innovative and pro-entrepreneurial environment is generally seen as a government task and the entrepreneurial behaviour is more commonly seen as the private sector domain. The interest in what we might call public sector and entrepreneurship is developing. The notion of pro-entrepreneurial government has been used in a number of divergent contexts eg. Bellone, Goerl, Moon, Shockley, Frank, Stough (Luke, Verreyne, Kearins 2010).

The role of local government (LG) in socio-economic development is not a new issue and it is discussed in the subject literature on local economic development (Collinge 1992). There have been conducted both theoretical and empirical research in this field (Xiaohong, Chen 2016). Scientist from 70' investigate LG economic role (Johnson, Cochrane 1981). The LG interacts with residents and the private sector, as well as serves services for residents and businesses (Thomo, Littunen. Storhamar 2010). Therefore, the role of LG is crucial in fulfilling needs of citizens and entrepreneurs (Moschidis, Ismyrlis 2018).

Local development (LD) it is a process that takes place in a particular territory and depends on the ability to create and stimulate its own development. LD as a specific category of socio-economic development is defined as qualitative changes related to a given area in terms of the standard of living of the population and the conditions of functioning of economic entities (Pike, Rodriguez-Pose, Tomaney 2017). LD initiatives are aimed at boosting the economy through the use of local resources. This is so-called bottom-up development (Kisman,Tasar 2014). However, in the context of regional development there also exists a top-down approach and it is important that bottom up initiatives should be skillfully linked to top-down central-level policies. Top-down approaches take into account the socio-economic environment and external factors in the socio-economic development process. Main theories concerning top-down development are represented inter alia by Smith, Ricardo, Keynes, North, Innes, Myrdal, Schumpeter, Hirschman, Perroux, Friedmann and others. According to the above-mentioned authors LD is supported by central authorities and diffusion of development generated in regions by leading centers (centers, cores) (Dzwigol et al. 2019). It is worthwhile to note that Nelson presents applying regional development theory to LD policy and he also presents both development-from-the-above and development-from-below schools in regional development (Bingham, Mier 1993). The LD requires actions at the local level that address the unique character of a particular territory. LD may be identified with intentional actions of local authorities which are aimed at creating new values as well as rational and effective use of human, natural, and cultural resources. A local government is not the only subject implementing LD but there are also non-governmental organizations, enterprises and the local society.

The role of LG in the context of supporting entrepreneurship is not new and it is discussed in the subject literature. To explain it, it is worth to mention approaches of neo-Marshallian Italian theorists who were explaining the phenomenon of the new industrial districts. The pioneers in the research were Becattini (1992), Bagnasco (1977) and then developed by researchers such as Stöhr, Ciciotti, Wettmann: indigenous potential, Johannison: local context, Secchi and Garofoli: system areas, Courlet-Bernard Pecqueur and Ganne: localized industrial system (Capello 2011). Moreover the past two decades have witnessed pressure on local authorities to become more entrepreneurial (Bond 2005).

In the paper we concentrate on the LG activities which indirectly contribute to LD. A local government is an important subject influencing investment that significantly contributes to local and regional development Gorzelak, Grosse, Miszczuk, Dziemianowicz (Serocka 2016). It has been obligated to perform both obligatory tasks as well as facultative tasks, aiming at satisfying the needs of local society as well as programming and

implementation of LD. It should be emphasized that LGs create a local social-economic reality. LG is oriented to the needs of a given local community, the possibilities of reasonable utilization of this area resources, the level of infrastructure, education etc. LG provides the unique added value to the development process. Apart from the activities defined above, local authorities exceed their locality and play an important role in accelerating the development process. LG is responsible for the issues related to current and future needs of a local community, inter alia for forecasting development directions, tendencies and development barriers, prevention of barriers formation and creation of cooperation system. LG are creators of development processes – they undertake actions to create conditions for the development of entrepreneurship and support it. LG initiates changes and implements stimulating entrepreneurship policies. It is regarded as formally responsible for undertaking activities which result in certain local regions being attractive for a potential entrepreneur (Lakshmanan, Chatterjee 2009).

In the paper we concentrate on the LG's activities which can contribute to LD. The starting point for our research was our perception that in a rapidly changing economy, which is dominated by technological progress and e-economy, the realities of functioning of the LG have also changed. We claim that websites of LG are becoming more and more popular and important for clients - entrepreneurs. The website of a particular LG is the place which is visited by an entrepreneur as the first one to search for information. Therefore, the data placed there and the way they are communicated may have an impact on reducing the TCs for an entrepreneur. The access to information, transparency of the investment offer, its readability and accuracy have an impact on the time that entrepreneur can devote to obtain and verify the aforementioned information. In addition, the readiness and response of the local authorities in the context of entrepreneurship is crucial.

We claim that the activity of the LG in the field of creating investment incentives which are designed to meet the needs of a particular locality can result in reducing the enterprise TCs.

The aim of the paper is to identify investment incentives offered by the LG and to recognize their importance in reducing enterprise TCs. To this end, we designed and conducted nonreactive and reactive research. According to the triangulation method, our research were based on the following methods: desk research, electronic audit, electronic survey and mystery client. The detailed methodology of the study, sampling frame and selection of the research sample are outlined in this paper. To identify financial and non-financial examples of investment incentives offered at the local level by the LGs in Poland we used desk research as well as survey.

To reach the main goal of the paper we formulated the following research hypothesis:

1. Local regions with the higher PIA (class A, B, C) offer more investment incentives and have higher level of pro-entrepreneurial behaviour can be observed.
2. Pro-entrepreneurial behavior and investment incentives offered by the LGs influence on reducing enterprise transaction cost.

What we understand as pro-entrepreneurial behaviour is behaviour such as permanent readiness for cooperation and quick reaction and response of the LGs to the needs of entrepreneurs in a new business creation context. Success in initiating and driving the European funding process involved proactiveness, innovation, risk-taking, leadership and creativity, a combination of attributes associated with entrepreneurial behaviour. Wrote about it eg. Miller and Friesen, Timmons and Spinelli.

In the paper we examined dependencies between the level of potential investment attractiveness (PIA) indicator of local regions and their pro-entrepreneurial behavior, as well as their response to the electronic survey and a mysterious customer. In order to confirm the dependence between PIA and pro-entrepreneurial behaviour we used statistical tools.

Furthermore, our research was concentrated on examining how Polish LGs have prepared their websites in the context of their investment offer. We verified the LGs readiness to help and cooperate with entrepreneurs, and

also pointed out what kind of investment incentives (financial and non-financial) they offer, which can result in reducing the enterprise TCs.

It is worth to mention about interesting empirical research aimed at how institutional environment specific factors affect the dynamics of entrepreneurship that was conducted by Roman, Rusu, Stoica (Roman et al. 2017). Their research presented the new expectations towards LGs and new tasks that result from the progressing process of socio-economic development and socio-political changes.

The interesting research was an object of investigation presented by other researchers in the report entitled *Institutional efficiency and local economic development-factors and interactions* (Marks-Bielska et al. 2017). The researchers introduced the concept of institutional efficiency and define it as “permanent readiness to maintain partner economic and social relations, both with entrepreneurs and with the local community; the ability of a quick, competent response of the local authorities to the needs of entrepreneurs who intend to establish and run a company in a given local region.” (Marks-Bielska et al. 2017). These studies confirm the validity of the analyzed topic, emphasize the role of the LG authorities and their pro-entrepreneurial attitudes in the LD.

2. Pro-entrepreneurial incentives of local government in creating investment attractiveness and reduction transaction costs of enterprises

The significant role of entrepreneurship in the economic development is an interest of scholars and policy makers at various levels (Eddelani et al., 2019; Sasongko et al., 2019; Petrenko et al., 2019; Orynassarova et al., 2019). One can find in literature the investigation concerning the dynamics of entrepreneurship in different countries depending on the lifecycle of business in order to identify the segments that require at most support of public authorities. The ability of LGs to attract entrepreneurs and to entice them to locate and conduct their business activity in their local region, is called investment attractiveness (IA) (Jac, Vondrackova 2017). IA is perceived as meeting the expectations of enterprises while considering investing in a defined investment location (Godlewska-Majkowska 2011). According to the Gdańsk Institute for Market Economics, IA „is understood as a capability to attract investment through a combination of business benefits linked to location. The areas that produce an optimal combination of location factors offer the best conditions to business operators and hence attract investment” (Nowicki 2012). Investment attractiveness is also defined on the basis of the location determinants leading to the reduction of investment and operational costs of an enterprise, thus contributing to maximization of profits and the reduction of risk of the investment failure. (Šebestová et al. 2015). The entrepreneur locating business in the local region decides for a certain offer and enters a specific environment of an enterprise (O’Gorman, Kautonen 2004). Moreover, the group of factors or incentives that determine the company’s location decision are not universal and might heavily depend on the LGs policies, specific assets, local strategies of development etc. Moreover, the entrepreneurs’ decisions are influenced by access to information (the possibility of obtaining necessary information in order to reduce TC of enterprises (see picture 1). Therefore, in order to reduce a company’s TC, the LGs should consciously tackle the easiness in availability of information characterizing a certain local region and should also inform and ensure favorable policy for entrepreneurs starting their businesses (Taylor 2006).

Transaction cost analysis is recognized as crucial in new institutional economics: Coase, Davis and North, Alchian and Demsetz, North, Williamson (1998), Klein, Crawford, and Alchian, Williamson, which focuses on how institutional rules structure the process of economic exchange (Lubell et al. 2017).

TC might consist of, among others, communication costs, time costs, government fees, taxes, information and search costs, administration costs and brokerage commissions. Throughout the literature, authors are mainly interested in studying the influence of transaction costs on portfolio choice and stock pricing (Ismael 2017).

TC are understood as costs occurring in the process of economic exchange between the exchange parties. They include among others the costs of checking the other party, costs of a contact resulting from the economic transaction, costs of transaction negotiations, costs of transaction contract creation, or costs of contract execution monitoring. In the context of the investment attractiveness and search of investment location, TC occur in relation to the identification and selection of the investment area (greenfield, brownfield), recruitment and training of employees, identification and contracting of suppliers. All these costs can be minimized by the LGs acting as a broker consciously minimizing asymmetry of information searched by transaction parties. Activities and services aiming at mitigation of transaction risk and elimination of information asymmetry between transaction parties maximize frequent and successful contracting (Hwang 2015).

The range of TC might vary depending on quality of formal and informal institutions in the defined locations. Therefore the potential investment attractiveness of a given location results from the preferences and choices of entrepreneurs willing to conduct economic transactions in that location. The transaction costs theory is directly linked with the school of new institutional economics (NIE). Formal and informal institutions are the key research subject of NIE and therefore it can influence minimization of TC for parties, and this way they have an impact on the attractiveness of economic exchange.

The literature review demonstrates that entrepreneurship in public organizations is a phenomenon that has been investigated very little to date, especially in the entrepreneurship literature. The existing studies are mainly conceptual (based on intuition or informal opinion) and non-cumulative. The main methods used to provide evidence are ad hoc biographies or case studies. Additionally, this paper attempts to fill the literature gap by empirically testing the applicability of the concept of public sector entrepreneurship in the context of European local government (Zerbinati, Souitaris 2005).

3. The methodology of the research

In order to compliment the empirical research, we decided to use the Boolean keyword searching and subject term searching in the following databases: EBSCO, Emerald and Google Scholar. The authors used these databases to search for phrases reflecting the investigated issues (local development, local government, transaction cost, investment attractiveness) and Boolean search operators such as AND, NEAR and PHRASE. The research was conducted between 21st -24th of July 2017. We checked coexistence of entrepreneurial activities investment attractiveness and transaction costs with local development, and also local government in scholar publications. The detailed analysis of the Boolean search results conducted by the authors led them to the conclusion that there existed a research gap in the field of the investment attractiveness and entrepreneurial activities in the context of the TC incurred (being lowered) by enterprises.

In the context of the research sampling frame the authors used the population of all local regions in Poland and performed stratified random sampling. The Authors intended to link identified activities of local regions with their potential investment attractiveness. Therefore, the indicator of PIA of local regions was used to define subpopulations constituting the base for stratification within the sampling frame. The indicator in question was developed in Warsaw School of Economics by a team of researchers. The methodology of its calculation has been thoroughly described in the subject literature (Godlewska- Majkowska, 2011). According to this methodology, the level of the potential investment attractiveness of a given spatial unit is determined by a number of sub-indices, aggregated in the so-called microclimates. There exist 5 microclimates calculated to determine the level of the potential investment attractiveness of a spatial unit: human resources, technical infrastructure, social infrastructure, market, and administrative ones. Sub-indices are calculated on the basis of quantitative data collected by the Central Statistical Office of Poland. Therefore, they are standardized and comparable among all the local territorial units in the country. Consequently, the degree of variation in the average level of total potential investment attractiveness, based on these microclimates, is presented by a synthetic indicator of the PIA.

(Godlewska- Majkowska, 2018). As a result, all the local regions in Poland can be classified into 6 classes ranging from the most (class A) to the least attractive (class F). In our paper we used the synthetic PIA index based on the public statistics of 31st December 2014. Stratification in our research sample selection reflected potential investment attractiveness classes from A to F and resulted in 277 local regions in the final sample the with assumed 95% level of confidence parameter and 5,5% level of expected error rate. The following detailed information reflecting the sample used in the research is presented in Table 1.

Table 1. Research sample

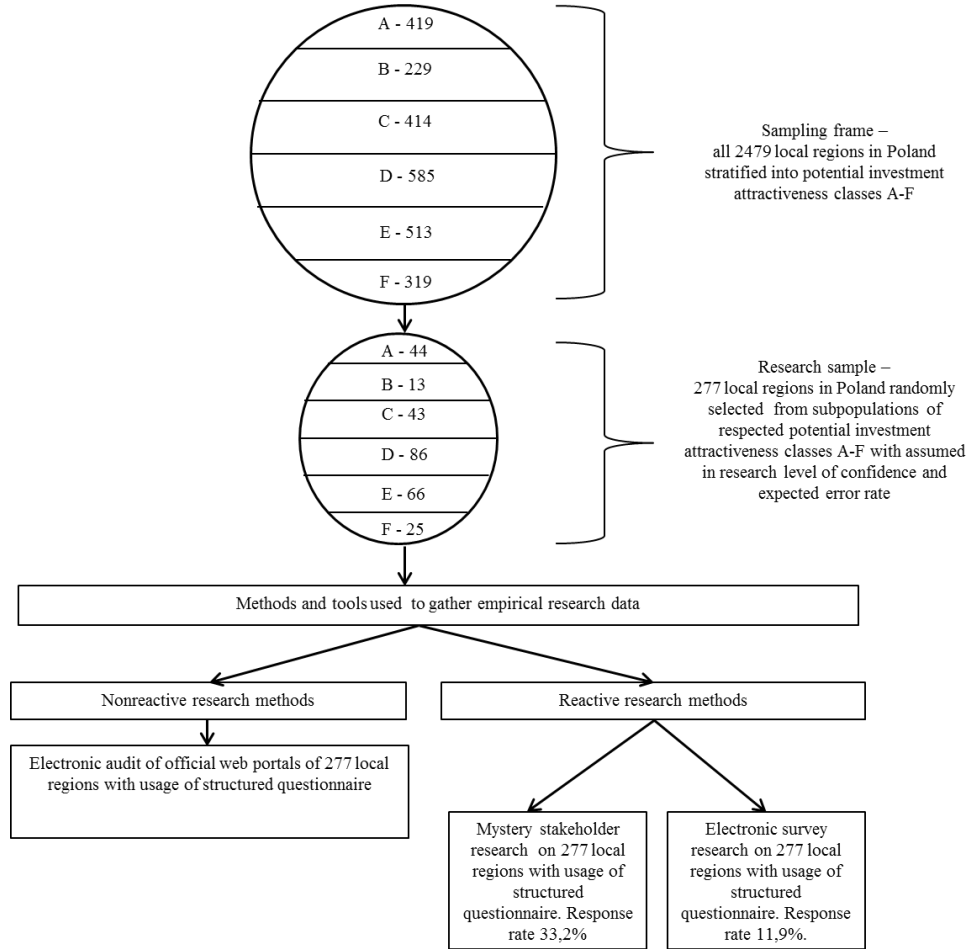
Potential Investment Attractiveness Class (from A to F)	Total subpopulation of local regions within Potential Investment Attractiveness Class for 31st of December	Final sample of local regions reflecting Potential Investment Attractiveness, assumed level of confidence and expected error rate
A	419	44
B	229	13
C	414	43
D	585	86
E	513	66
F	319	25
Total number of local regions	2479	277

Source: Own elaboration.

The research was conducted using both nonreactive and reactive research methods. The basic nonreactive research method used was electronic audit of official websites of the local regions. This electronic audit consisted of analyzing the local regions websites with the application of a structured questionnaire composed of 42 questions bundled in thematic blocks focused on communication of a local region with an entrepreneur, a local region's investment offer, and local region investment incentives. The main purpose of the electronic audit was to identify and classify the content of the official websites of the local regions which could be useful for entrepreneurs. The electronic audit of all the 277 local regions with the usage of standardized set of questions and unified method of coding the answers was performed between 13th of July 2017 – 18th of August 2017.

What the authors decided to use as a reactive research method was the mystery customer method. We used the electronic correspondence prepared from the position of a company, which was sent to official electronic correspondence addresses of the local regions in the research sample. Our electronic account was created exclusively for the research purposes. The set correspondence consisted of a short introduction explaining the reason of the contact and 5 questions related to a new business activity planning to be set up in a given local region. We also enquired about the availability of the investment infrastructure, investment incentives and their support for entrepreneurs. The mystery customer research of all the 277 local regions with the usage of the standardized correspondence and a unified method of coding the answers was performed between 1st of August 2017 – 24th of August 2017. As 92 out of 277 local regions responded to the mystery customer, the response rate in the mystery customer method research was 33.2%. All the received answers were coded afterwards. The electronic audit research and mystery customer research were complemented with an electronic survey sent to the official administrative representatives of the local regions in the sample. The electronic survey consisted of 5 questions related to the subjective perception of attractiveness of the investment offer, their approach toward the decrease of costs of a new business activity set up and the factors important in a new entrepreneur's attraction to the local region. The electronic survey research of all the 277 local regions with the usage of the standardized electronic survey questionnaire and the unified method of coding the answers was performed between 27th of July 2017 and 31st of August 2017. Among the 277 local regions research representatives only 33 sent filled questionnaires. The response rate in the electronic survey method was 11,9% and the received answers were coded properly. The empirical research data gathered with the usage of the above-mentioned methods and tools

was analyzed with the application of both quantitative and qualitative data analysis methods including the usage of Statistica software version 13.1. The sampling frame, research sample and methods used in the research performed are presented in picture 1.



Picture 1. Sampling frame, research sample and methods used in research performed.

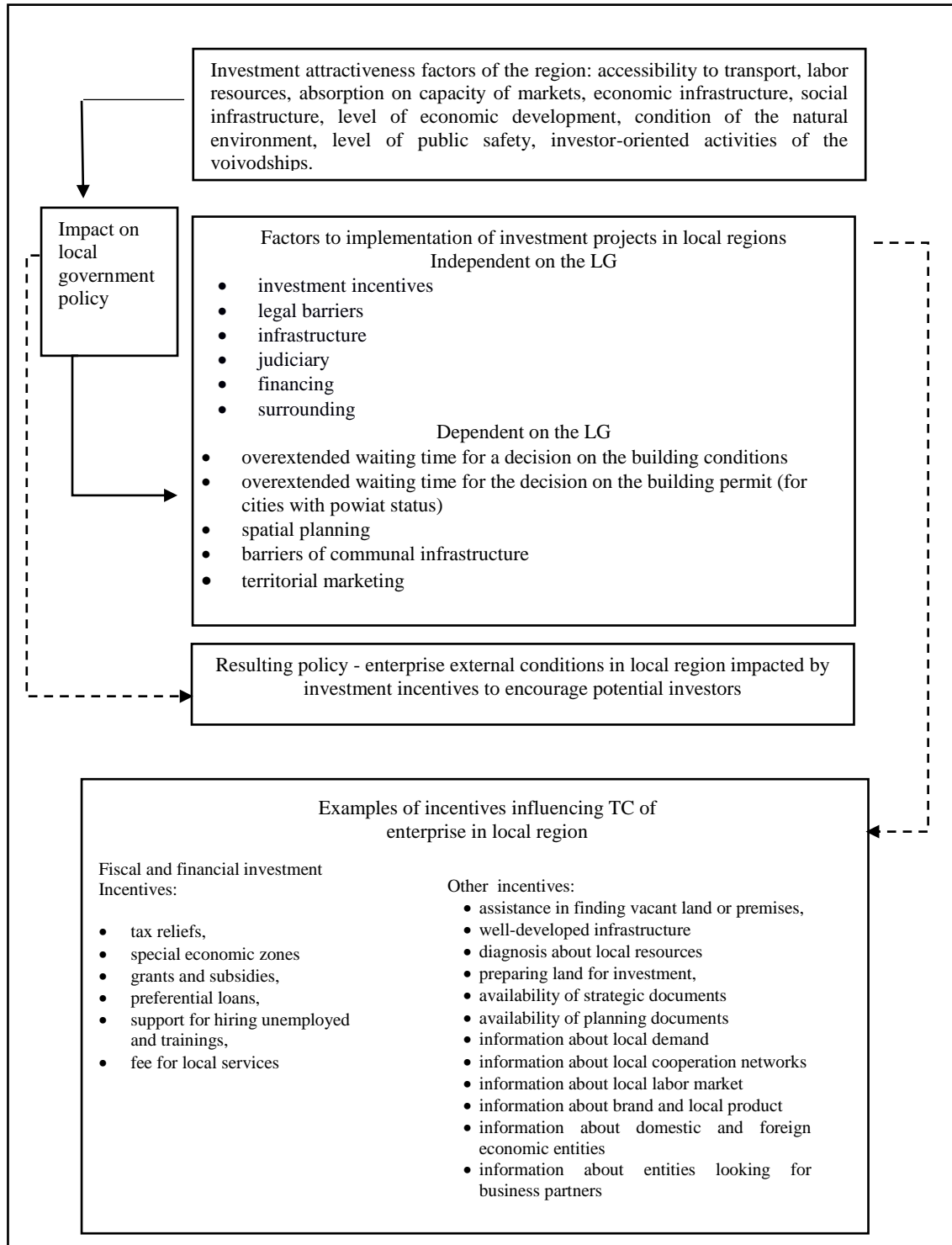
Source: Own elaboration.

4. Results and discussion

4.1. Investment incentives of local government and reducing transaction costs for enterprises

Investment incentives are usually defined as measures or instruments which objective is to influence size, location or sector of considered direct investment through minimization of relative investment costs or risks. Scholars distinguish among others fiscal incentives, which are the most popular ones and refer to lowering the basis for calculation of the income tax. Financial incentives, which refer to subsidies and participation in the costs of investment by investment attracting party and legal incentives which lead to exemption of entrepreneur from certain obligations. To identify investment incentives offered by the LGs we conducted a desk research, which allowed us to prepare a list of incentives important for potential investors in order to decrease TC of enterprises.

The picture 2 presents local business environment in the context of investment attractiveness as well as investment incentives influencing TC of enterprises.



Picture 2. Scheme of local business environment in the context of investment attractiveness and investment incentives

Source: own elaboration on basis (Maron 2013)

The investment incentives offered to entrepreneurs include fiscal and financial encouragements. These incentives are designed to influence the attractiveness of certain local regions and to increase the financial efficiency of enterprises by reducing the cost of their current operations as well as their investment costs and taxes.

On that base we created a questionnaire used in the audit of particular local regions websites. The electronic audit allowed us to check which investment incentives are offered in the examined local regions to enterprises in the context of reducing their transaction costs. In the course of our electronic audit research we distinguished between fiscal and financial (investigated as one type) and other investment incentives offered by local regions to entrepreneurs. Among all the sample of 277 local regions researched, 15% of them communicated offer of fiscal and financial incentives in their official websites. On average 26% of local regions with high PIA (class A-B) offered fiscal and financial incentives, whereas in relation to local regions with medium PIA (class C-D) and low PIA (class E-F) it was respectively 18% and 5%. Among fiscal and financial incentives offered, the most popular were exemption or decrease of local real estate tax, exemption or decrease of local vehicle tax, subsidy to setting-up economic activity, and subsidy to employment of juvenile employees. Detailed distribution of fiscal and financial incentives offered by local regions in our sample is presented in figure 1.

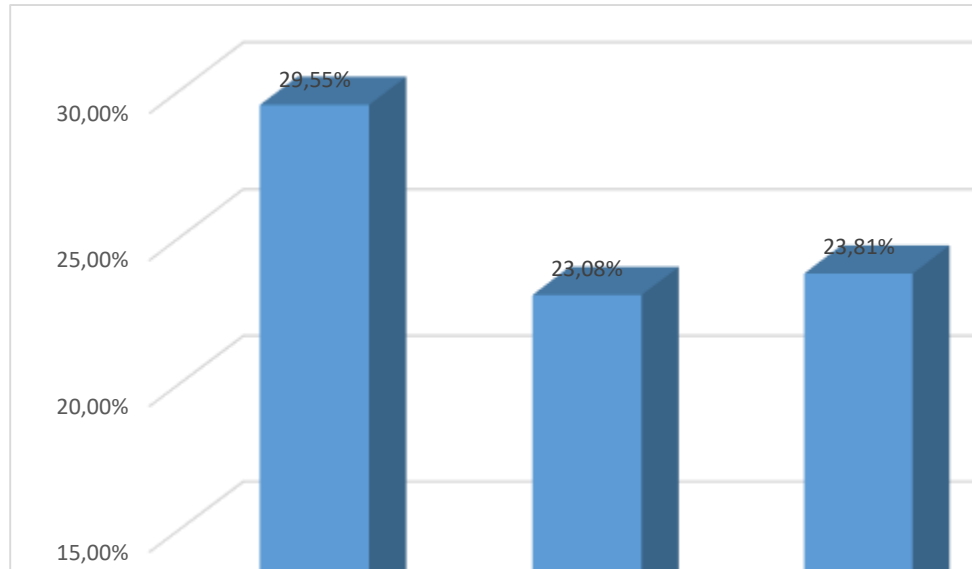


Figure 1. Percentage of local regions from the research sample with fiscal and financial incentives for entrepreneur communicated through their official website and their PIA (class A-B – high, class C-D – medium, class E-F – low)

Source: Own study basing on research performed.

In our research we also investigated other investment incentives with intention to identify non-fiscal and non-financial ones. Among 277 examined local regions, 15% of them communicated offer of non-financial and non-fiscal incentives in their official websites, but only a fourth of them belonged to the subpopulation of local regions that also offered fiscal and financial incentives elaborated above. Among the most interesting non-fiscal and non-financial incentives communicated in the official websites of local regions we identified offers of support in preparation of business plan, business advisory and business trainings, free of charge conference room for the use of entrepreneurs, or free of charge accounting services for starting entrepreneurs arranged by LG. Surprisingly these incentives were demonstrated mostly by local regions of medium PIA (class C-D) as they were offered on average by 16% of them. Local regions with the lowest PIA (E-F) and highest PIA (A-B) offered them with respectively 13% and 11% frequency. The difference in assumed high expectation toward demonstration of these type of incentives by high and medium class local regions resulted from the fact that high and medium class local

regions offered more incentives of fiscal and financial type. There is no doubt that the calculation of statistical metric of average for high class local regions has been impacted by no incentives of that type identified among local regions of B class. Details are presented in the figure 2.

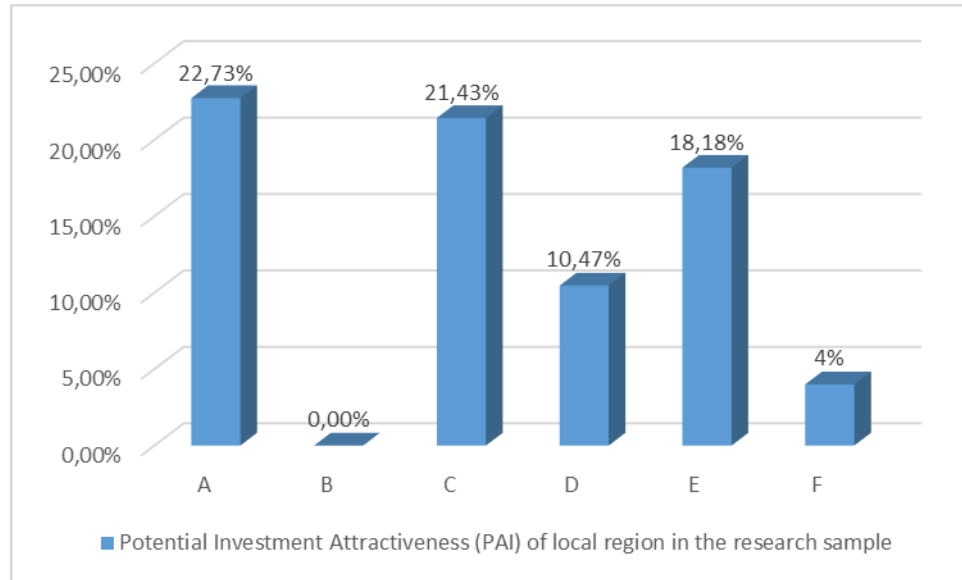


Figure 2. Percentage of local regions from the research sample with non-fiscal and non-financial incentives for entrepreneurs communicated through their official website and their PIA (class A-B – high, class C-D – medium, class E-F – low).

Source: Own study basing on research performed.

Among the offers for entrepreneurs our particular attention was given to downloadable investment folders, brochures or movies, which presented benefits from locating an investment in defined spatial unit. In TC theory context such information has a certain value for entrepreneur as when it is not provided and location is considered, the information needs to be collected and analyzed either by entrepreneurs themselves or ordered as a service and paid for. New institutional economics analyses which alternative structures and activities of government reduce TC (Wojtyna, 2001). Referring to that, we have identified that almost 9% from all local regions in our research sample offered professional, downloadable folder, brochure or movie on investment benefits related to their spatial area.

We have found out that a part of these resources were prepared in several language versions. Among all the types of local regions investigated, those of high PIA (class A-B) offered such material on average in 23% of cases, whereas in relation to local regions of medium PIA (class C-D) and low PIA (E-F) this frequency dramatically decreased and ranged respectively from 11% to 1,5%. In our view as preparation of such materials is relatively non-intensive in terms of resources and costs, such low ratios among local regions with medium and low PIA are unsatisfactory and indicate room for sharing the best practices and improvement. Figure 3 presents details of the distribution of the answers received to question related to it.

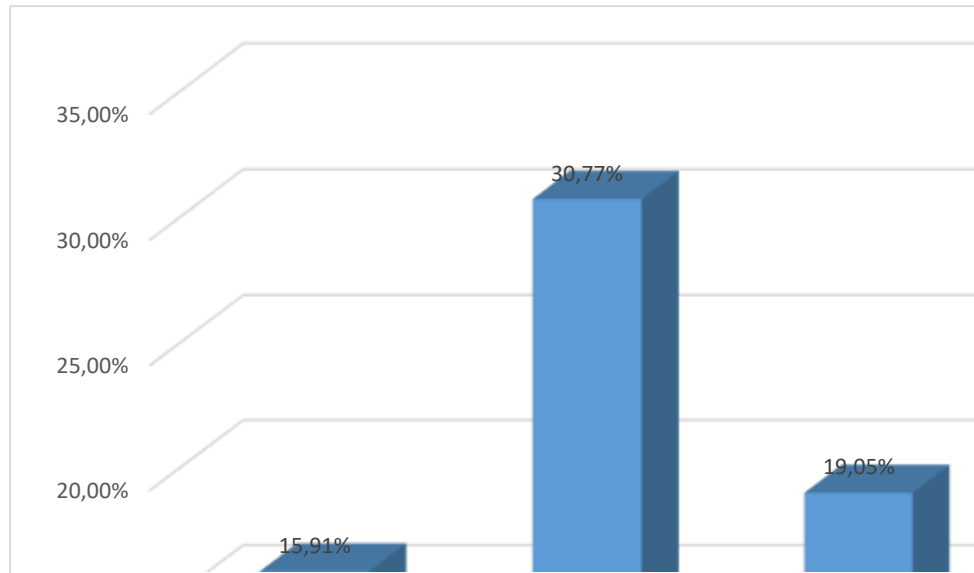


Figure 3. Percentage of local regions from the research sample with non-fiscal and non-financial incentives for entrepreneur communicated through their official website and their PIA (class A-B – high, class C-D – medium, class E-F – low).

Source: Own study basing on research performed.

4.2 Pro-entrepreneurial incentives of local government in the context of investment attractiveness

In our study we researched how many of investigated local regions communicate potentially required information for entrepreneurs in LG official websites, thus enabling access to this information, shortening the search time, and saving an enterpriser's time.

General information related to starting a new business was communicated by 12% of all 277 investigated local regions. On average 19% of local regions with high PIA (class A-B) offered information about starting a new business in their official websites, whereas in relation to local regions with medium PIA (class C-D) and low PIA (class E-F) it was respectively 11% and 6%. It is worth to add, that only 3% of investigated local regions inform entrepreneurs through their websites about indirect advisory e.g. business consultancy, business plan consultancy, and for entrepreneurs this information seems to be really important from TC point of view. TC of enterprise, as mentioned above, can be reduced for instance by simplifying access to information on entrepreneurs located in local region. The electronic audit revealed surprisingly high percentage of investigated local regions (62%) communicating on their websites information about enterprises located or operating in their area (see figure 4) The result are as follow: on average 80% of local regions with high PIA (class A-B), 63% with medium PIA (class C-D) and 53% of local region with low PIA (class E-F).

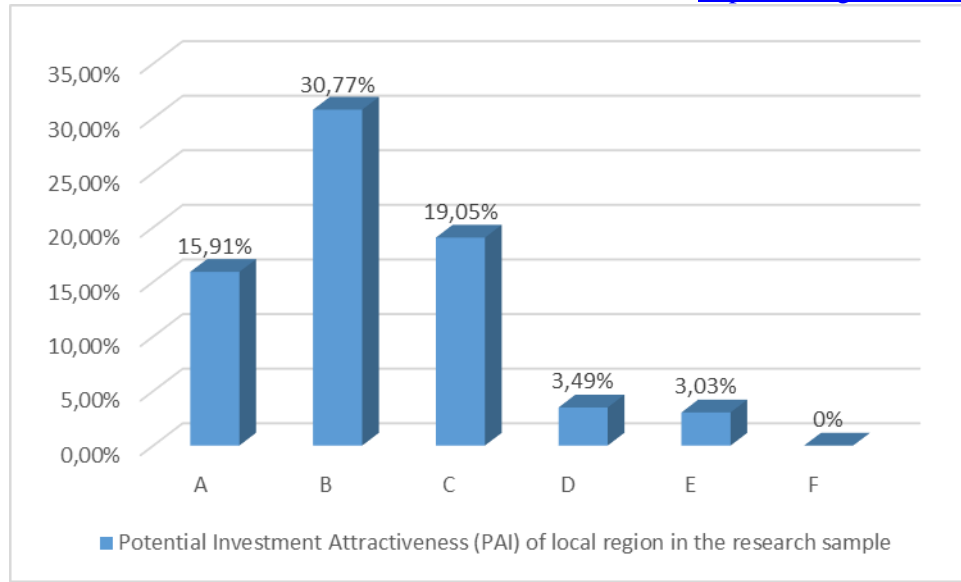


Figure 4. Percentage of local regions from the research sample with information for entrepreneurs concerning the enterprises located there and communicated through their official website and their PIA (class A-B – high, class C-D – medium, class E-F – low).

Source: Own study basing on research performed.

Among factors contributing to local region's offer for entrepreneurs, we also noticed information on labour market and fairs and exhibition organized by LG. In relation to the first one, only 7% of all investigated local regions communicated the information about labour market (in the form of local business job offer) in their official websites. The same applies to fairs, exhibitions, economic missions or economic site visits (taking into account the interests of entrepreneurs). Only 6,5% of investigated local regions communicated that information in their websites.

To verify the hypothesis, we investigated if there is correlation between potential attractiveness investment of local regions and their pro-entrepreneurial behavior. To achieve it, we used a mystery customer research method. It referred to sending communication by entrepreneur to all local regions in our sample with request to support finding a business location, finding employees, finding place to purchase or rent for conducting business activity, availability of formal investment offer and readiness for a direct meeting. These aspects relate to TC of an entrepreneur which they need to bear when selecting and deciding on locating economic activity in a defined spatial unit. Therefore, answers to this set of questions were scored by us from 0 to 5 basing on the depth of the answer given to aspects mentioned above. We analyzed local regions which earned at least 4 points out of 5 points (80%) possible which is equivalent of a good grade in most common grading methodologies. A good grade among local regions of high PIA (class A-B), medium PIA (C-D) and low PIA (E-F) was earned by respectively on average in 14%, 6% and 8% of them. Relatively high demonstration thorough answers received by mystery customer from local regions of the highest PIA (class A) is less surprising that on average low PIA (class E-F) local regions achieved better results than those which PIA is of medium level (class C-D). Figure 5 presents the details.

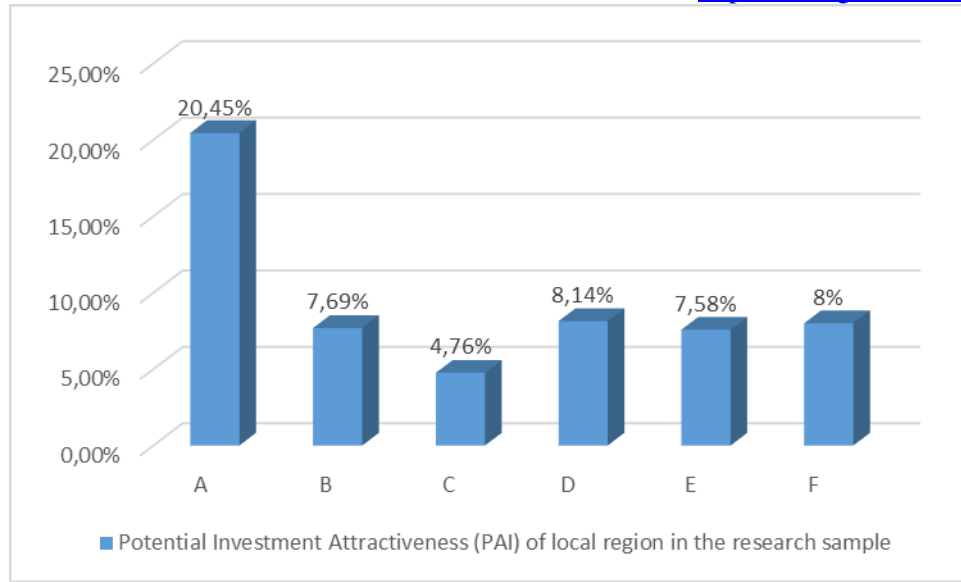


Figure 5. Percentage of local regions from the research that earned at least 4 for 5 points possible in mystery stakeholder research where interaction with LG was investigated through electronic correspondence with LG. Presented in relation to PIA of local region (class A-B – high, class C-D – medium, class E-F – low).

Source: Own study basing on research performed.

We checked if local region representing particular classes from A to F (PIA) responded to the survey and to the mysterious customer more frequently as they have the higher PIA.

To achieve that we used Spearman rank test and as a result we have got a positive correlation between PIA indicator of particular local regions and their activity in responding for sent survey and for the mysterious stakeholder (‘Spearman's $R=0.157$, $p=0.009$). Local regions with higher PIA answer more frequently than the rest of local regions.

Moreover, the conducted research showed that the higher PIA the local regions have, there was the higher frequency of their answer for survey. The difference in mean values between classes is significant ($p = 0.02$) in the test of variance analysis Annova rang Kruskal-Wallis, what is presented in table 2.

Table 2. Breakdown Table of Descriptive Statistics

Breakdown Table of Descriptive Statistics			
Class	Answers to the number of questions (0-5) Means	Answers to the number of questions (0-5) N	Answers to the number of questions (0-5) Std.Dev.
A-B	1,315789	57	1,794415
C-D	0,751938	129	1,436309
E-F	0,648352	91	1,361157
All groups	0,833935	277	1,508864

Source: Own study basing on research performed.

On the basis of the research, it can be concluded that the class A-B stands out against the rest in terms of responses to the survey. There were dependencies between the PAI indicator and the frequency of responding to the electronic survey. From pro-entrepreneurial point of view the reaction of local regions on electronic survey was not so significant as the reaction for mystery customer. In the case of a response to the electronic survey by us, the LGs express their commitment to scientific and design issues, while the answer to the mysterious customer's questions directly indicates interest in the entrepreneur.

Among all the samples of 277 local regions only 11% responded to the electronic survey, while 33.2% responded to the mysterious client question (see figure 6).

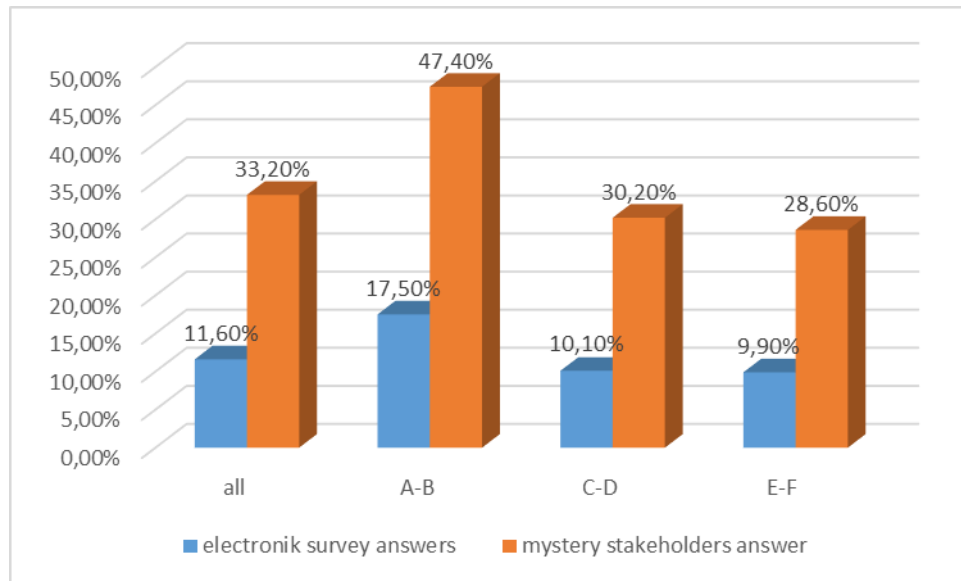


Figure 6. Percentage of local regions from the research sample which actively participated in mystery stakeholder research and in electronic survey sent to official administrative representatives of the local regions in the sample. Presented in relation to PIA (class A-B – high, class C-D – medium, class E-F – low).

Source: Own study basing on research performed.

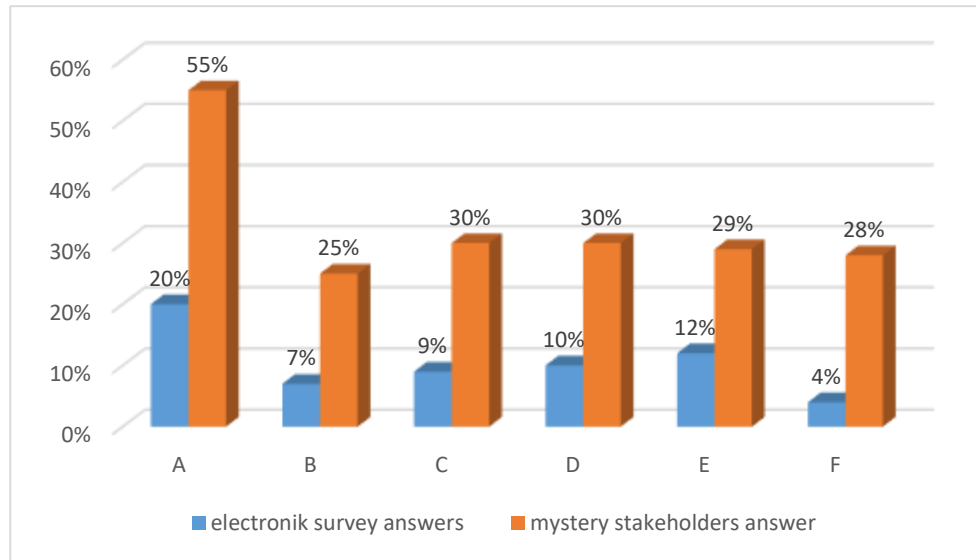


Figure 7. Percentage of local regions from the research sample which actively participated in mystery stakeholder research and in the digital survey sent to official administrative representatives of the local regions in the sample. Presented in relation to PIA and classes (class A, B, C, D, E, F).

Source: Own study basing on research performed.

We found out that the highest percentage of responses to both the electronic survey and the mystery stakeholder was noted by local regions representing class A (with the highest PIA) (see figure 7). In other groups, the relationship between the PIA class and responding survey and to mystery customer was not observed.

Conclusions

In the light of the research results, it can be stated that LGs play an important function in shaping the conditions of economic activity within the local regions. This is the way to control indirectly the activities of economic entities in compliance with the objectives of local economic development policies. As a part of the broadly understood LD, the LGs undertake many different efforts to make their local region attractive both for inhabitants and entrepreneurs (Lakshmanan and Chatterjee 2009).

Most of the LGs' activities are focused on creation and development of technical infrastructure, institutional support and use of fiscal, financial and other incentives for entrepreneurs. The fiscal, financial and other incentives, despite being elaborated in scholar literature, are relatively non-utilized in practice of LGs we have examined. In the context of decreasing TCs for economic entities, the investment incentives saving entrepreneurs time or resources might impact the investment decision and preference toward a certain location. In our research sample only 2.5% of all the local regions investigated offered on their official websites documents, instructions or content which constitute a guide for starting entrepreneurial or investment activity in the local region. Moreover, only 3.5% of all the local regions investigated offered support in setting-up an economic entity through a direct contact and individual support.

Our research shows that the most popular investment incentives offered currently by the LGs in Poland are: tax reliefs, grants and subsidies. The most interesting non-fiscal and non-financial incentives of the local regions identified in our research refer to: support in preparation of business plan, business advisory and business

trainings, free of charge conference rooms for entrepreneurs, or free of charge accounting services for starting entrepreneurs arranged by the LGs.

As a result of statistical analysis of the collected source material, conducted with the application of Spearman's rank test, Annova rang Kruskal-Wallis variation test a weak positive correlation between PAI and mystery applicant was observed which is the starting point for further research.

In the light of these arguments and results presented above, we believe that the LGs can, with relatively non-intensive resource usage, deploy a plethora of improvements decreasing the TCs for entrepreneurs to attract them and enable them to contribute to the LD process.

As part of the implementation of the adopted research objective, the verification of the hypothesis assuming the coexistence—the higher level of PAI, the higher level of readiness and reaction of the LGs — has also been carried out. Taking into account the results of the statistical tests we stated that the hypothesis (no 1.) concerning the dependence between the level of local regions PIA and the pro-entrepreneurial behavior has not been verified positively. In the investigated phenomena, the local regions from A-B PIA class not always demonstrated the highest intensity of the studied issues.

The assumptions resulting from the research objectives have also been implemented. We presented the list of the investment incentives offered by the local regions with the highest PIA. This information can be used by other the LGs in developing strategic development plans in the context of developing local businesses.

Finally, it is necessary to underline that our research was influenced by a relatively low level of return of the survey responses that is why our conclusions are relatively general. Moreover, correlation observed in the study can become the starting point for further research. We recommend involving the LGs in an in-depth investigation of entrepreneurial behaviour of the LGs in order to check their influence on the entrepreneur's TCs as well as to improve mutual cooperation of LGs and business sector.

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Anna MEMPEL-ŚNIEŻYK (PhD) is the Assistant Professor at the Department of Spatial Economy and Local Government Administration at the Faculty of Economic Science of Wrocław University of Economics. Her interests include: clusters, network cooperation, local and regional development.

ORCID ID: orcid.org/0000-0001-7704-4923

Niki DERLUKIEWICZ (PhD) is the Assistant Professor at the Department of Macroeconomics at the Faculty of Economic Sciences of Wrocław University of Economics. Her interests include: innovative economy and entrepreneurs, local and regional development, innovation strategies.

ORCID ID: orcid.org/0000-0002-3967-3048

Tomasz PILEWICZ (Ph.D) is the Assistant Professor at the Collegium in Business Administration of Economic Science of Warsaw School of Economics. Professional MBA Entrepreneurship & Innovation Alumnus. His research interest include: entrepreneurship, local and regional development, investment attractiveness, business location, transaction costs.

ORCID ID: orcid.org/0000-0002-3199-9959

Malgorzata ZDON-KORZENIOWSKA (Ph.D) is the Assistant Professor at the Department of Entrepreneurship and Spatial Management in the Institute of Geography of Pedagogical University of Cracow. Her research interest include: market orientation of local government, territorial marketing, management of tourism at local and regional level, regional tourism products.

ORCID ID: orcid.org/0000-0002-4970-0310

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EVALUATION OF ESCAPE ROOM COMPETITIVE POSITION IN POLISH MACRO REGIONS WITH 2D AND 1D STRATEGIC GROUP MAPS*

Marzena Wójcik-Augustyniak¹, Ewa Multan²

^{1,2} Faculty of Social Sciences, University of Natural Sciences and Humanities, Siedlce, Poland

E-mails:¹ marzena.wojcik-augustyniak@uph.edu.pl; ² ewa.multan@uph.edu.pl

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Abstract. For the purpose of this article a strategic analysis of the escape room sector in Poland has been carried out for the first time, using new variants of strategic group maps. The aim of the paper is to test the technique of multi-sector 2D (two-dimensional) strategic group maps and a new version of 1D (one-dimensional) strategic group maps for the analysis and evaluation of the competitive position of selected escape rooms in Polish macro regions in 2018. In addition, the paper proposes procedures for the development of new variants of strategic group maps, as well as recommendations to escape room owners and investors in particular parts of Poland. The main scientific problem of the article is to investigate to what extent new variants of strategic group maps can be applied in strategic analysis. The hypothesis assumes that 2D (two-dimensional) and 1D (one-dimensional) strategic group maps can have various applications in strategic analysis. The conclusions of the research conducted with the use of multi-sector 2D strategic group maps contain a partial evaluation, both horizontal and vertical, of the competitive position of escape rooms. Elements of differentiation strategy of an escape room, such as the minimum price for a room, its ranking in Lockme.pl, and the game difficulty level is taken into account. Using 1D strategic group maps the research makes it possible to evaluate the situation in escape rooms in Poland by their key stakeholders, i.e. owners and clients. 1D strategic group maps included in this paper present differences and similarities between the owners' and clients' opinions about the difficulty level of escape rooms. The recognition of the existence of those differences or similarities, whether the views converge or diverge, helps in the decision-making concerning future strategies.

Keywords: escape rooms, macro-regions (NUTS1), strategic analysis, 2D strategic group maps, 1D strategic group maps, stakeholders

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1. Introduction

Carried out with popular techniques of business environment analysis, studies on a sector provide information on its competitive position to make better decisions about shaping differentiation strategy of Strategic Business Units

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(SBU). One of the techniques used for this purpose is strategic group maps. The classical version of this technique is described by foreign and Polish authors (Hunt, 1972; McGee, Thomas, 1986; Cool, Dierickx, 1993; Porter, 1994; Jeannet, Schreuder, 2015; Gierszewska, Romanowska, 2017; Wójcik-Augustyniak, Multan, 2017). According to the authors of this article an interesting solution to improve the classical 2D strategic group map, enriching its use in the evaluation of the competitive position, would be its multi-sector variant and one-dimensional variant, incorporating assessments of the situation by different stakeholder groups.

The variant of multi-sector strategic group maps assumes that one map illustrates and analyses situation of the same type of business activities in several geographical sectors. This is a particularly interesting and useful solution for companies operating in local markets. The novelty of the multi-sector variant presented in this article is:

- procedure for developing multi-sector 2D strategic group maps,
- access to horizontal and vertical comparative analyses,
- recommendations about decision-taking on strategies and their implementation, taking into account various geographical areas.

The evaluation approach using 1D maps, on the other hand, is based on the comparison of different assessments of various stakeholder groups, with their opinion on one of the selected criteria of the competitive environment. It is part of a comprehensive evaluation of the competitive situation in a business sector. According to the authors a complete assessment of a competitive position in sector should consists of the following attempts: static, dynamic, and evaluating, all of which are described in one of papers on this topic (Wójcik-Augustyniak, Multan, 2017). The novelty of the evaluation approach presented in this article is:

- a model of 1D strategic group maps,
- procedure for developing 1D strategic group maps,
- opportunity to use 1D strategic group maps,
- a support to take decisions on the ongoing business strategy, taking into account key stakeholder groups.

Analysis of the competitive position of escape rooms (which are treated in this article as Strategic Business Units – SBU) in Poland, with new variants of strategic group maps is carried out for the regions of the NUTS 1 level.

The article is addressed to a wide range of managers of various types of organizations that operate in many markets or intend to start operations in new markets, and the used tool (2D strategic group map) may apply not only to NUTS 1, but also to other types of territorial division (e.g. NUTS 2, countries).

The article consists of 6 parts, such as: evolution of escape rooms sector, the NUTS classification in Poland, methods, the analysis of the escape room sector in macro regions of Poland with usage of two variants of strategic group maps 2D and 1D, and procedures.

2. Evolution of escape rooms sector

The beginning of escape room companies dates back to 1988, when the first game from the group of virtual ones based solely on the text appeared on the monitor screen. At that time the action of the game itself was enough for the player to enjoy it and to pursue its aim, which was to escape from a locked room. The essence of the escape game is to get out, which is possible only after fulfilling tasks and solving puzzles located in the room. With the development of information technology, activities of escape room games have become more varied and enriched with detailed graphics in the room. That has made them one of the so-called "point and click" games, with a player in front of the screen with a mouse in his or her hand. The need of a higher level of expertise and difficulty to solve puzzles during the game has led to an increase in interest among players using computers, smart phones, and tablets. No one expected in the beginning that the development of this type of game would turn into

an escape from a real room. This meant that the game had become really realistic and players, leaving their computers behind, had to go personally to the mysterious room, trying their hand to check whether they were up to solving the tasks to be able to escape within the designated time (Lockme.pl).

The first game with a real life escape room was established in the Silicon Valley in 2006 and was created by computer programmers. The action content was inspired by the works of Agatha Christie. In 2007 Takao Kato opened the first escape room in Japan (Escape room, room escape, 2016). After that, since 2011 escape games have been set up in Singapore (Marinho, 2012) and Budapest. In the latter city an escape room was founded by the Parapark company, a Hungarian franchise, which later acted in 20 places in Europe and Australia (Bence, 2016). In 2012 a friend of Kato's brought the Real Escape Game to San Francisco (Cheng, 2014).

In time escape rooms have become popular in the United States, the United Kingdom, Canada, Israel, Japan, Taiwan, and mainland China. In 2015 the first evacuation games were offered to clients in South America, in Porto Alegre and São Paulo. In September 2017 there were already more than 8000 escape room businesses around the world (exitgames.co.uk 2017). Escape rooms at fixed locations were opened first in Asia, then in North America, Europe, Australia, New Zealand, Russia, and South America (Rospopina, 2015).

An escape room, which is a bit of a game, partly theatre, or an integration exercise, breaks records of popularity around the world. Such popularity on global markets has meant that during the last several years it has become more and more popular in Poland. The first Polish design was established in Wrocław in 2013 (Kowalik, 2015), and since 2014 companies have been set up throughout the country to construct rooms for playing an escape game (Lockme.pl).

Currently in any big city in Poland one can take advantage of a few rooms, or even of dozens of them, developed for complex activities. The rooms are varied widely for game plots. One can book rooms full of secrets, or scary ones. Rooms vary also in price, duration of the activities, number of persons involved, and difficulty level. Escape rooms are designed for the whole family and their friends to have fun. This is also a way to carry out corporate events, like networking activities for new employees, because many of the puzzles in rooms require teamwork and good communication between the players. So it is a great combination of fun with training, which can lead to better results at work. Escape rooms are a diverse mix of different mini-games, with a goal to bring the player to an end, that is, to escape from the room before the designated time (Lockme.pl).

For companies escape rooms can be very rewarding financially, due to their relatively low costs (Waterhouse, 2017) and quick, up to a year, return on investment (French, Shaw, 2015).

3. The NUTS classification in Poland

Due to the fact that the article is focused on business activities in local markets, it is appropriate to present a description of escape room companies in geographical terms. The authors have assumed that the simplest way to divide the territory of Poland for the purpose of this research is by using the existing territorial division of EU Member States into three regional levels with specific numbers of the population. This division, which is a geographical standard, is used for statistical purposes and is called the Classification of Territorial Units for Statistics, NUTS. The classification was established in order to collect, develop, and distribute comparable data for particular regional statistics throughout the European Union and for shaping regional policies of European Union countries. It is used to carry out analyses of the degree of socio-economic development of EU regions. The NUTS classification was introduced with the regulation of the European Parliament and of the Council of 26 May, 2003 (*Regulation (EC) no 1059/2003*), and went into force on 11 July 2003 (*Classification of Territorial Units for Statistics*).

The NUTS classification divides each Member State of the European Union into territorial units: NUTS 1, NUTS 2, and NUTS 3. Territorial units of the NUTS 1 level are divided into territorial units of the NUTS 2 level, and these are divided into territorial units of the NUTS 3 level; one territorial unit can represent several NUTS levels. The assumption of the classification is that the units of a level with all Member States of the European Union should be similar to each other in terms of the population number.

The NUTS classification was formally introduced in Poland on November 26, 2005, at the time of the entry into force of the regulation of the European Parliament and of the Council amending Regulation on the establishment of the Classification of Territorial Units for Statistics (NUTS) by reason of the accession of the Czech Republic, Estonia, Cyprus, Latvia, Lithuania, Hungary, Malta, Poland, Slovenia, and Slovakia to the European Union (*Regulation (EC) no 1888/2005*). In the case of Poland, this classification has been applied since the time of Polish accession to the European Union on 1 May 2004. During the subsequent three revisions of NUTS between 2004 and 2015 the division of Poland into NUTS 1 and NUTS 2 units had not changed. What had changed was the division into NUTS 3 sub-regions. It was a result of the fourth revision of NUTS in 2016 (*Commission Regulation (EU) 2016/2066*) when the division of the country changed at all NUTS levels, with one new unit added to each level. Since January 1, 2018, 97 NUTS units has operated in Poland (*The NUTS classification in Poland*):

- NUTS 1 – macro-regions (with Poland's regions) - 7 units (Figure 1),
- NUTS 2 regions (with voivodships or their parts) - 17 units,
- NUTS 3-sub-regions (with counties) - 73 units.



Fig.1. Division of Poland into NUTS 1 units

Source: The NUTS classification in Poland, 2018

4. Methods

The aim of the paper is to test the technique of multi-sector 2D (two-dimensional) strategic group maps and a new version of 1D (one-dimensional) strategic group maps for the analysis and evaluation of the competitive position of selected escape rooms in Polish macro regions in 2018. The main scientific problem of the article is to investigate to what extent new variants of strategic group maps can be applied in strategic analysis. The hypothesis assumes that 2D (two-dimensional) and 1D (one-dimensional) strategic group maps can have various applications in strategic analysis.

For the purposes of this article the escape rooms sector in Poland has been studied for the first time. The study has a pilot nature due to the fact that its main purpose is to test a new version of 1D strategic group maps and a new kind of 2D strategic group maps with a multi sector approach (Multan, Wójcik-Augustyniak, 2016).

Assuming that a sector, according to the classical definition of M.E. Porter, is "part of an industry that groups companies manufacturing similar products or providing similar services, selling them in the same geographic

market" (Porter 1994, p. 23), the authors have assumed that in the case of escape rooms there are seven territorial sectors, corresponding to seven macro regions (statistical classification of the NUTS 1 level). This approach has for the first time made it possible to present all those geographical sectors in Poland on one 2D map. In order to test the technique of multi-sector 2D strategic group maps and 1D strategic group maps in the analysis and evaluation of the competitive position of selected escape rooms, the authors use the current list with 328 escape room entities in Poland, with 914 rooms available on the lockme website (Lockme.pl). With regard to the aim of the research the authors have applied the statistical method of purposive random sampling:

- purposive selection of cities for further analyses (capital cities of all voivodships in all NUTS 1),
- random selection in the case of 2D and 1D maps (selecting the first escape room from the list in the capitals of voivodships in macro-regions and then every 10-11th from this list) (lockme.pl/ranking).

In each of the analysed cities 10% of the escape rooms have been selected, which means that 10% of the total number of 678 rooms is rounded up to 69 rooms.

The authors propose the following pairs of criteria that make up the configuration of 2D strategic group maps:

- the first pair of criteria: X: macro region, i.e. location/ Y: the minimum price for a room,
- the second pair of criteria: X: macro region, i.e. location/Y: position of the room in the ranking.

In the article three significance levels of criteria of differentiation strategy of an escape room are applied to *the minimum price for a room* and to *the place of a room in the ranking* (Table 1).

Table 1. Significance levels with differentiation strategy elements of an escape room: *the minimum price for a room and the position of a room in the ranking*

Significance level (1-3)	Significance level name	Significance level range	Significance level description	Minimum price for a room (PLN)	The position of the room in the ranking
1	Low	(0-33.33)	with the share of differentiation elements less than 33.33	up to 66	over 640
2	Medium	<33.33-66.66)	with the share of differentiation elements from 33.33 to 66.66	from 67 to 133	from 320 to 639
3	High	<66.66-100)	with the share of differentiation elements from 66.66 to 100	over 134	under 319

Source: own elaboration

In addition, for the purposes of the construction of 2D strategic group maps the third pair of criteria is used: X: macro-region / Y: declared difficulty level of the room (declared by the room's owner). For the seven macro regions a seven-point scale has been adopted (Table 2), while for the declared difficulty level of a room a five-point scale is used (Table 3).

Table 2. Differentiation strategy elements of an escape room: the *macro-region*

Scale	Macro region
1	Central
2	Southwestern
3	Mazovian
4	Eastern
5	Northern
6	Northwestern
7	Southern

Source: own elaboration

For the purposes of the construction of 1D strategic group maps the following criteria are proposed: *the declared difficulty level* and *the evaluated difficulty level* assessed by clients, both with a five-point scale (Table 3).

Table 3. Differentiation strategy elements of an escape room:
the *declared difficulty level* and the *evaluated difficulty level*

Scale	Declared difficulty level	Evaluated difficulty level
1	absolute beginner (AB)	very easy (VE)
2	beginner (B)	easy (E)
3	intermediate (I)	average (A)
4	advanced (A)	difficult (D)
5	proficient (O)	very difficult (VD)

Source: own elaboration

In parts 5 and 6 of the article, the analysis of the escape rooms sector is presented. Thanks to this it will be possible to state to what extent strategic group map 2D and strategic group map 1D are applicable in strategic analysis. It will allow to solve the research problem and verify the research hypothesis.

5. The analysis of the escape rooms sector in macro regions Polish using multi-sector 2D strategic group maps

This article attempts to use the technique of strategic group maps for the analysis of the competitive position in the escape rooms sector. It is the first time a variant of the multi-sector strategic group maps has been used this way. So far, classical 2D maps have illustrated the situation in one separate geographical region (according to Porter's definition). However, the authors are trying to demonstrate that it is possible to present competitive situation in different locations. This approach may be applicable to the analysis of a sector in which companies operate in local markets. It is possible to provide an image of the SBU competitive situation on one map, depending on the area of activity. Table 4 presents evaluation data on escape rooms in macro regions of Poland in 2018.

Table 4. The evaluation criteria of the escape rooms sector in macro-regions in Poland
in August 8, 2018

The name of the room	City	NUTS 1 macro region	Position of the room in the ranking		Minimum price for the room		Difficulty level		Market share (number of votes)
			level	evaluation	level (PLN)	evaluation	level	evaluation	
Desolate Garage	Kielce	Central	692	1	79	2	A	4	9
Prologue	Łódź	Central	58	3	200	3	I	3	176
Behind the Scenes of Hollywood	Łódź	Central	256	3	120	2	I	3	12
Manuscript	Łódź	Central	382	2	120	2	A	4	75
Crime	Łódź	Central	502	2	79	2	B	2	52
Haunted Closet	Łódź	Central	637	2	99	2	I	3	30
Orphanage	Opole	Southwestern	568	2	120	2	A	4	14
Insanity	Wrocław	Southwestern	6	3	181	2	I	3	84
Necromancer	Wrocław	Southwestern	65	3	135	3	I	3	52
Abandoned Puppet Theatre	Wrocław	Southwestern	221	3	120	2	B	2	191
Amnesia	Wrocław	Southwestern	341	2	100	2	B	2	73
Doc's Surgery	Wrocław	Southwestern	517	2	100	2	B	2	70
Laser	Wrocław	Southwestern	774	1	99	2	A	4	17
Strange Circus	Warszawa	Mazovian	4	3	150	3	A	4	136

Trapped in a Bunker	Warszawa	Mazovian	59	3	120	2	A	4	105
Sex Room	Warszawa	Mazovian	109	3	90	2	B	2	997
Desert Island	Warszawa	Mazovian	149	3	99	2	B	2	379
Room of Puzzles	Warszawa	Mazovian	192	3	120	2	B	2	36
House in the Jungle	Warszawa	Mazovian	268	3	179	3	I	3	94
ShowShank	Warszawa	Mazovian	303	3	149	3	I	3	73
Time Machine	Warszawa	Mazovian	417	2	150	3	B	2	131
Sherlocked	Warszawa	Mazovian	485	2	80	2	B	2	70
Cosmic Odyssey	Warszawa	Mazovian	551	2	110	2	A	4	173
Return of the Dragons	Warszawa	Mazovian	702	1	159	3	A	4	40
Old Circus	Warszawa	Mazovian	920	1	88	2	B	2	5
Pharaoh's Curse	Białystok	Eastern	320	2	80	2	I	3	15
Antique dealer's room	Lublin	Eastern	290	3	99	2	A	4	61
CSI – Crime Scene Investigation	Lublin	Eastern	694	1	5	1	I	3	28
The Attic of Columbus	Lublin	Eastern	864	1	99	2	A	4	10
Pharaoh's Tomb	Rzeszów	Eastern	101	3	100	2	I	3	234
Nautilus – Undersea Adventure	Bydgoszcz	Northern	1	3	100	2	A	4	240
Angor Wat Depths	Bydgoszcz	Northern	52	3	80	2	I	3	65
Nuclear Reactor	Bydgoszcz	Northern	174	3	60	1	I	3	23
Dream Factory	Bydgoszcz	Northern	449	2	100	2	B	2	13
What a Circus	Gdańsk	Northern	126	3	99	2	I	3	114
Escape from Prison	Gdańsk	Northern	223	3	129	2	A	4	260
Shelter	Gdańsk	Northern	391	2	80	2	A	4	66
Ghost from Alt Allenstein	Olsztyn	Northern	338	2	99	2	A	4	7
Time Machine	Toruń	Northern	59	3	90	2	A	4	95
Scary Circus	Toruń	Northern	249	3	79	2	I	3	21
Guantanamo	Gorzów Wielkopolski	Northwestern	618	2	80	2	B	2	14
Connoisseur	Poznań	Northwestern	8	3	130	2	I	3	57
Backstage	Poznań	Northwestern	67	3	100	2	I	3	64
Magic School	Poznań	Northwestern	167	3	79	2	B	2	53
Debt	Poznań	Northwestern	239	3	100	2	A	4	27
Interrogation Room	Poznań	Northwestern	362	2	100	2	B	2	4
Flora Mortis	Poznań	Northwestern	455	2	85	2	I	3	42
Short but Crazy	Poznań	Northwestern	548	2	99	2	I	3	20
Shelter	Poznań	Northwestern	794	1	100	2	B	2	2
Nautilus	Szczecin	Northwestern	73	3	99	2	I	3	77
Se7en	Szczecin	Northwestern	198	3	80	2	A	4	104
Grey's Room	Szczecin	Northwestern	568	2	100	2	B	2	24
Sherlock - Holly Grail	Szczecin	Northwestern	895	1	69	2	I	3	1
Workshop of a School Scientist	Zielona Góra	Northwestern	563	2	99	2	A	4	21
Moriarty Limited	Katowice	Southern	3	3	99	2	I	3	268
Think like a Hunter	Katowice	Southern	236	3	99	2	I	3	33
Father Leon- the exorcist's, chapel	Katowice	Southern	383	2	89	2	B	2	83
PsychoEd	Katowice	Southern	691	1	99	2	I	3	9
Escape da Vinci	Kraków	Southern	20	3	100	2	I	3	212

Disgusting Hotel	Kraków	Southern	86	3	100	2	I	3	59
Ei! It's my beat	Kraków	Southern	260	3	90	2	I	3	60
Prisoner	Kraków	Southern	452	2	90	2	B	2	149
Star Wars – New Adventure	Kraków	Southern	535	2	88	2	B	2	26
Laboratory	Kraków	Southern	701	1	99	2	AB	1	64
AmberGold	Kraków	Southern	832	1	99	2	I	3	12
Total	-	-	-	-	-	-	-	-	5831

Source: own elaboration based on www.Lockme.pl

Due to the fact that among the total number of 678 rooms there were also ones being in preparation, only 65 escape rooms were considered for further analyses. It is worth adding that the largest number of 678 escape rooms in Poland was located in Warsaw - 129 (Mazovian macro region). This is due to the fact that the capital city of Warsaw is the largest in terms of population and the richest city in Poland, taking into account GDP per capita (Koza 2018, for: Regional Innovation Scoreboard 2017).

After the identification and evaluation of the criteria in the sector of escape rooms divided into macro regions, the next stage is to build a 2D strategic group map with selected pairs of criteria (in accordance with the provisions set out in tables 2 and 3), and then to incorporate the evaluation (with the scale of 1-3 and 1-7) on the X and Y axes of the coordinate system for individual rooms from Tab. 4. The result is a presentation of the situation in a geographical region with a strategic group map (figures 2-4). The market share is presented using circles of different diameters reflecting the number of votes of escape room clients. The data of multi-sector 2D strategic group maps can be analysed horizontally and vertically.

Strategic horizontal analysis allows determining what competitive situation of the rooms in various macro regions is, taking into account the number of strategic groups, the sum of the market shares of these groups, and the total number of rooms offering services at all levels of the analyzed criterion of differentiation strategy in the macro region. Strategic vertical analysis allows determining what competitive situation of the rooms in various macro regions is, taking into account the number of strategic groups, the sum of the market shares of these groups, and the total number of rooms offering services at the same level of the analyzed criterion of differentiation strategy in the macro-region.

Analysis of the data in the Figure 2 shows that in NUTS 1 geographical sectors of escape rooms in Poland there are eight strategic groups and four independent strategic business units (SBUs).

The number of escape rooms with the highest total market share of strategic groups offering services at level 2 of the minimum price (67-133 PLN) is the largest. This level can therefore be regarded as the greatest price advantage in all Polish macro regions. The number of rooms offering services at level 2 of the minimum price is 56, which represents 86% of the analyzed rooms, while the total market share of this level is 87.54%.

Vertical analysis indicates that in the majority of macro regions there is usually one strategic group. There are two strategic groups (C and D) in the Mazovian macro region only. In the Central, Southwestern, Eastern and Northern macro regions there are independent SBUs. In the richest macro regions: Mazovian, Southwestern, and Central, there are escape rooms offering services at level 3 of the minimum price (over 134 PLN), while in the Eastern and Northern macro regions they offer services at level 1 of the minimum price (66 PLN).

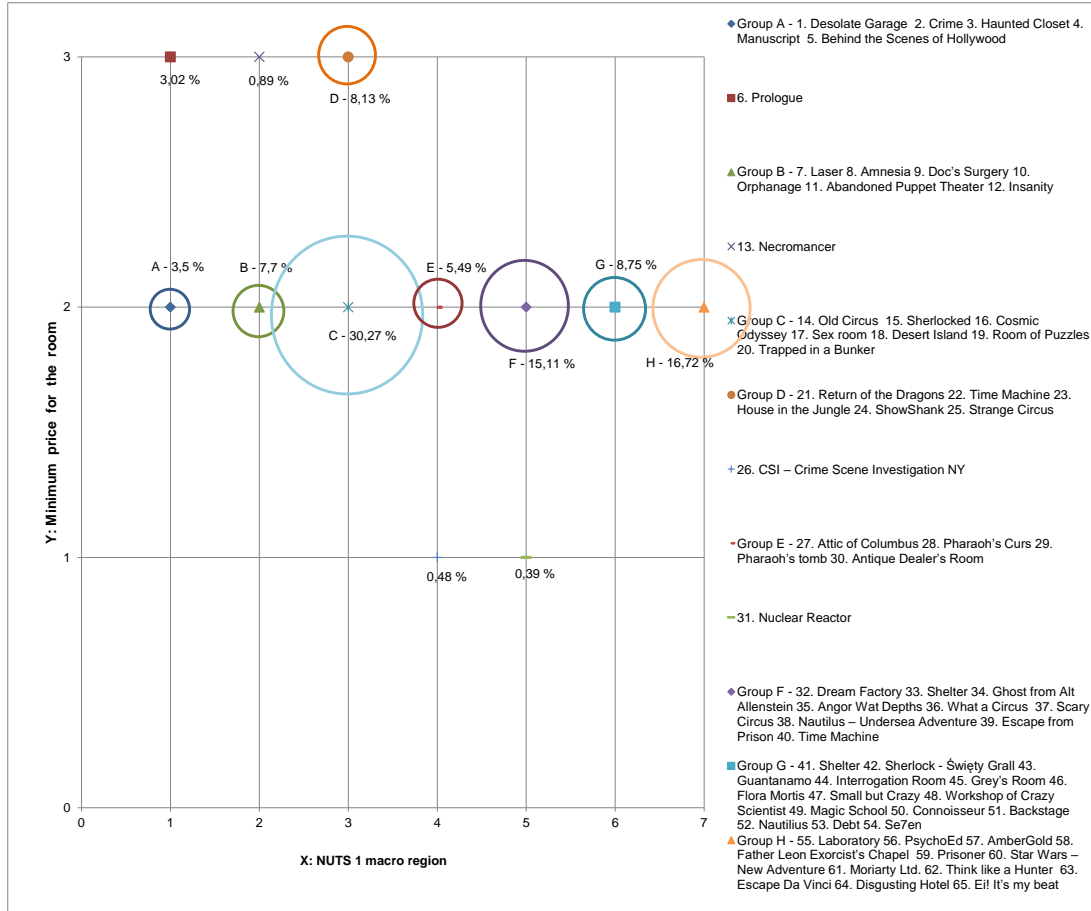


Fig.2. 2D strategic group map of escape rooms in macro regions of Poland -the 1st pair of factors

Source: own elaboration based on Lockme.pl

Rooms located in the Mazovian, Southern, and Northern macro regions have the highest market share.

From the point of view of owners intending to open new escape rooms in other locations and of investors who want to enter this sector, it may be profitable to open rooms with level 2 of the minimum price in Central and the Southwestern macro regions where there is a relatively small number of rooms, or those of level 3 which are independent SBUs with a low market share.

In the Eastern macro region the best way may be to open escape rooms with level 1 or/and level 2 of the minimum price. In this macro region there are only a few rooms, but because of a lower income of potential clients there, the prices for this type of entertainment would have to be lower than in other, richer macro regions of Poland.

The escape room data presented in Figure 3 show that in all NUTS 1 geographical regions there are 17 strategic groups and 4 independent SBUs. The largest number of strategic groups with the highest total market share offer services at level 3, with the position below 319 in the ranking. This level can be considered the biggest advantage of a room in the ranking in all Polish macro regions. The best rooms in the ranking are visited by clients who, sharing their opinions, encourage others to use the services of these rooms.

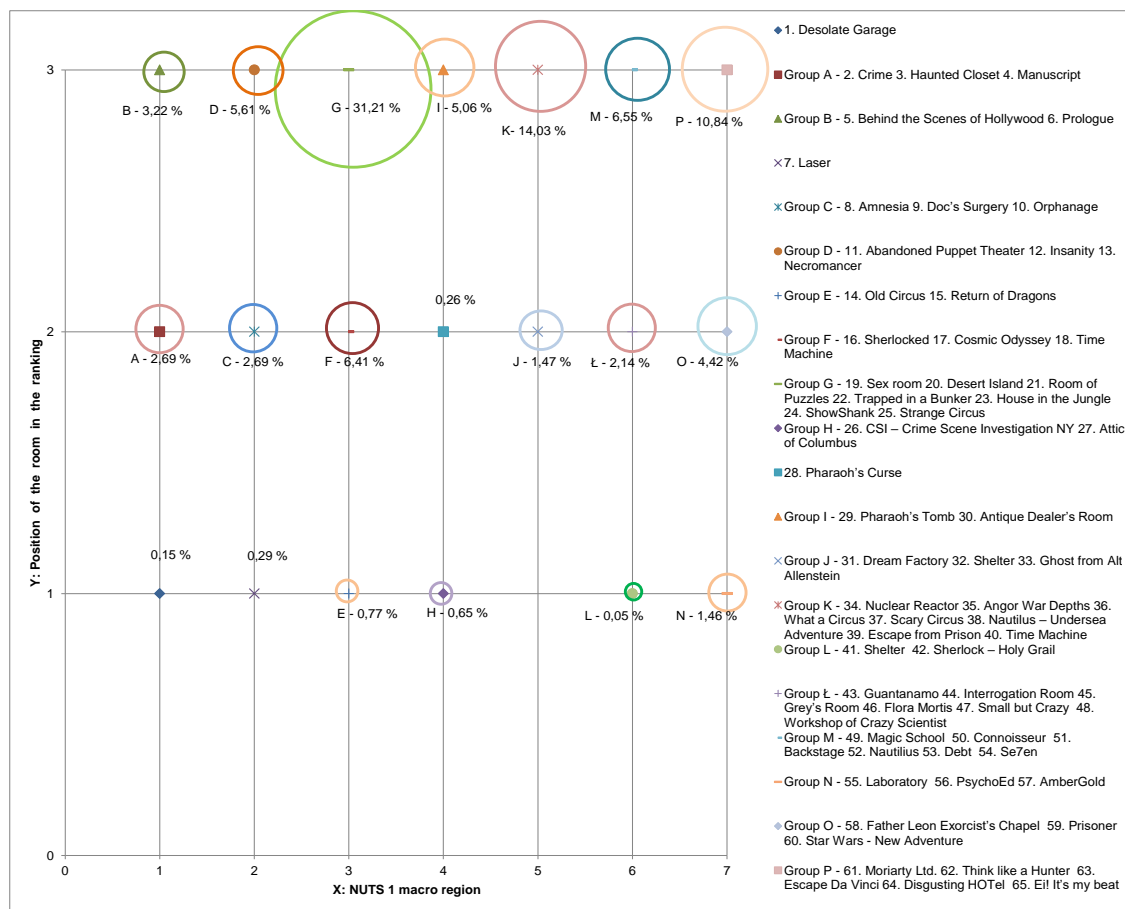


Fig. 3. 2D strategic group map of escape rooms in macro regions of Poland -the 2nd pair of factors

Source: own elaboration based on Lockme.pl

The number of rooms with the highest ranking (level 3) is 32, which represents 49% of the analyzed rooms, while the total market share of level 3 in the ranking is 76.52% of those included in the study. All rooms of level 2, with the position in the ranking from 320 to 639, accounted for 20.08% of the market share, with the number of rooms equal to 22 (34% of the analyzed rooms). There are 11 companies offering services with level 1 with the position below 640 in the ranking, representing 17% of the analyzed rooms.

The rooms which are lower in the ranking are usually those with a shorter time on the market, and therefore they have a lower chance to attract a high number of clients. Vertical analysis shows that in the majority of macro regions there are two or three strategic groups of escape rooms or independent SBUs. In the Mazovian macro region there are three strategic groups (E, F, and G), with the largest total number of 12 rooms, the highest combines market share of 38.39%. This macro region constitutes the largest market share of the number of escape rooms with level 3 in the ranking (31.21%).

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Analysis of the data presented in Figure 4 shows that in these geographical sectors (NUTS 1) there are 17 strategic groups and 3 independent SBUs.

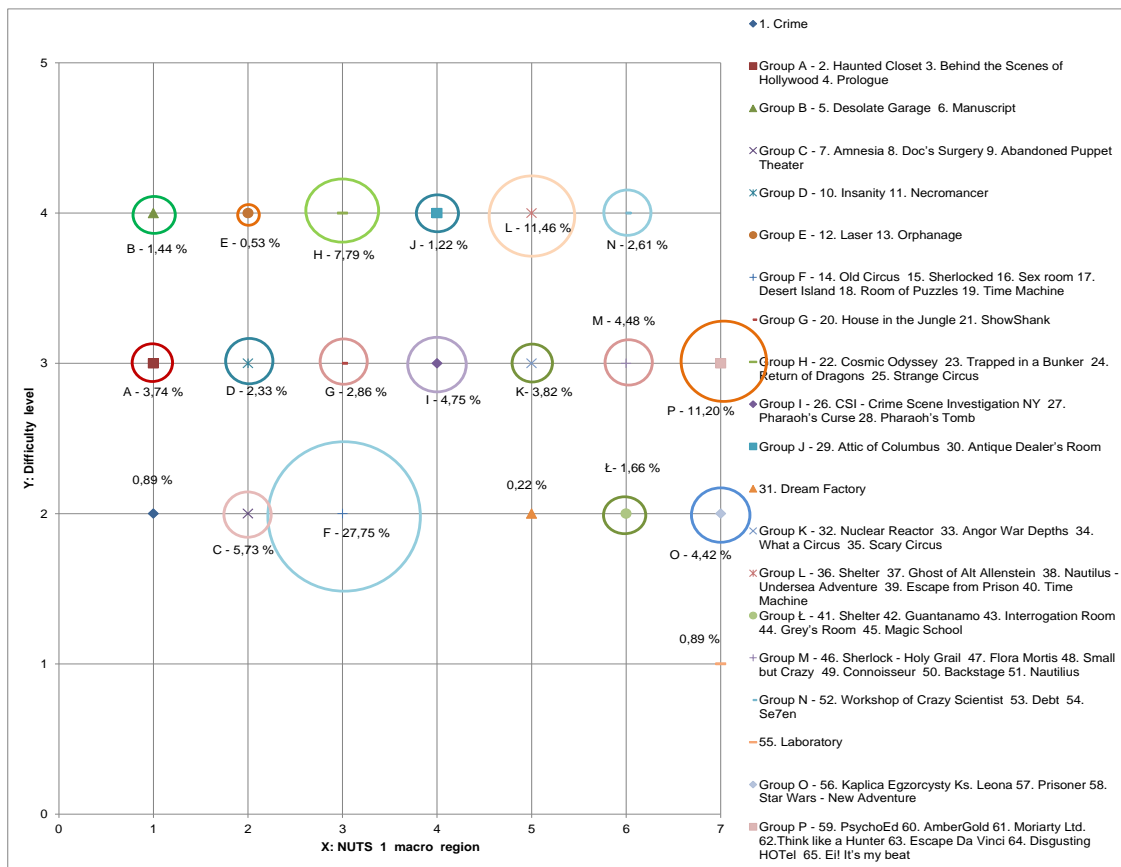


Fig. 4. 2D strategic group map of escape rooms in macro regions of Poland - the 3^d pair of factors

Source: own elaboration based on Lockme.pl

In terms of the market share the largest group are the rooms whose owners have declared difficulty level 2 (for *beginners*). The total share of such rooms in all macro regions is 41.56%, and the number of rooms is 19 (29% of the analyzed rooms). The largest group is made up of escape rooms that declare difficulty level 3 (for *intermediate* clients). Their number is 27, which is 41.5% of all analyzed rooms, and their combined market share is 33.18%.

It must therefore be assumed that the rooms in all macro regions with the declared level of difficulty for *beginners* and *intermediate* players make the biggest profit. In fact there is a lack of rooms at the declared 1 and 5 levels (for

absolute beginners and for *proficient* players), but there is one room for *absolute beginners* among the escape rooms.

Vertical analysis of strategic group maps reveals that in the Mazovian macro region rooms for *beginners* are the most popular (six rooms with the largest market share of 27.75%), while those for *advanced* clients (4) constitute only 7.79%. The relatively small difference in numbers does not translate proportionally to a small difference in market shares.

Clients in the Northern macro region prefer complex puzzles for advanced users mostly, while players in the Southern one prefer rooms of average difficulty (level 3). It seems that the declared difficulty level can evolve from the lowest up to the highest as the life expectancy of the service rises, and the owners acquire the knowledge and experience, or from the very beginning they declare the level of room difficulty (sometimes in a subjective way), and then change it when the experience and knowledge of the clients taking part in the game rise.

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The research presented in part 5 allowed for positive verification of the research hypothesis which assumed that 2D (two-dimensional) strategic group map can have various applications in strategic analysis.

In order to compare opinions and find out whether there is an agreement (or lack of it) in the evaluation of the difficulty level between owners and clients the technique of 1D strategic groups maps is used.

6. The analysis of the escape room sector in macro regions of Poland using a variant of 1D strategic group maps

1D strategic group maps are applied in this research to carry out detailed analyses of escape room data in all macro regions of Poland. A proposed variant of 1D strategic group maps takes into account the evaluation of one criterion in one dimension by various stakeholder groups. Stating, after I. Figurska, that "*Using only internal sources of knowledge in the process of building a competitive position by the organization is not enough*", and that the organization's clients are one of the external sources of knowledge, thanks to which the organization can

gain knowledge about their "*changing needs, perceptions company and its products, etc.*" (Figurska 2014: 211), in the escape room sector the classical version of 2D strategic group maps is enhanced with objective and subjective evaluation of the difficulty level by owners and clients.

In this article, the technique of 1D strategic groups maps is tested to analyze the position of a sector in seven macro regions in 2018. That demonstrates divergence or convergence of opinions among different stakeholder groups. The purpose of the 1D strategic groups map (Figure 5) is to adjust the existing strategy to a situation when there are divergent evaluations of variables by key stakeholders.

Divergence is a situation in which there is a dissimilarity in the evaluation of criteria/variables made by two external and/or internal stakeholder groups (the field of divergence). Convergence is a situation in which there is a similarity in the evaluation of criteria/variables made by two external and/or internal stakeholder groups (the field of convergence).

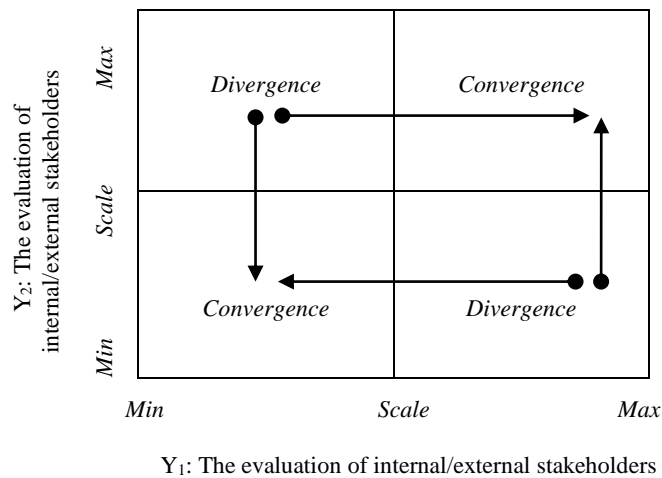


Fig. 5. 1D strategic group map with opinions of various stakeholder groups

Source: own elaboration

On coordinate axes a scale can be adopted, for example, using numbers (from 1 to 5 or from 1 to 10). To build a 1D matrix model the authors proposed the following configuration of variables/criteria assessed by two groups of stakeholders, i.e. owners and clients:

- Y₁: the owner's evaluation (the owner-declared level of difficulty),
- Y₂: the clients' evaluation (the client-evaluated level of difficulty).

After the identification and evaluation of the criteria in the macro regions, the next stage is to build a 1D strategic group map with selected pairs of criteria (in accordance with the provisions set out in table 3), and then to incorporate the evaluation (with the scale of 1-5) on the Y₁ and Y₂ axes of the coordinate system for individual escape rooms from Table 4.

In order to test the new variant of 1D strategic group map, an analysis of the competitive situation in escape rooms sector in three selected macro-regions of Poland: the Mazovian, the Northern and the Southern was conducted, thus presenting the diversity of the situation in the geographical terms.

Examples of 1D strategic group maps of all macro regions in Poland are presented in figures 6-8.

The data presented in Figure 6 show that the escape rooms in the Southern macro region are in the fields of divergence and convergence in the evaluation of the difficulty level. On the strategic group map there are two strategic groups and two independent SBUs. Group A, located in the convergence field, has the largest share (11.21%) and includes the largest number of analyzed rooms (7). Group B consists of two rooms (Father Leon the Exorcist's Chapel, Star Wars - New Adventure), with a market share of 1.69%. Two rooms which are independent SBUs with the share of 2.56% and 1.1% (Prisoner and Laboratory) are located in the divergence field. The total share of rooms in the divergence field is 5.35%. A low market share of rooms with divergence in the evaluation of the difficulty level should be a signal for the owners to change the strategy by changing the difficulty level to make it adequate to clients, offering a more difficult game (new puzzles, more complex puzzles, short-time games, etc.), or an easier one.

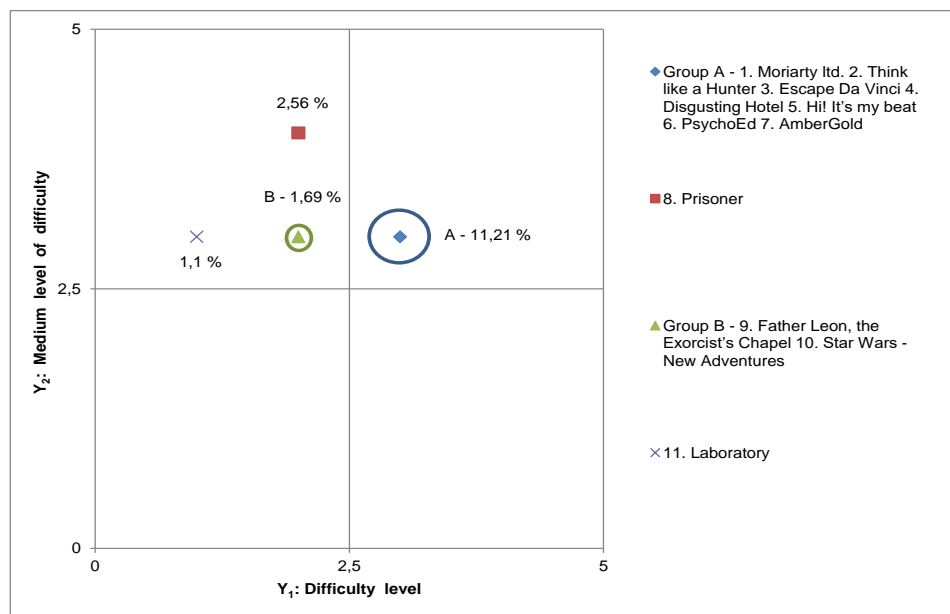


Fig. 6. 1D strategic group map of escape rooms in the Southern macro region of Poland

Source: own elaboration based on Lockme.pl

Based on the data presented in Figure 7, it can be concluded that the analyzed escape rooms in the Mazovian macro region are located in convergence and divergence fields in the evaluation of the difficulty level. On the map there is one strategic group A composed of three rooms (Sex Room, Desert Island, Sherlocked) with the highest market share in Poland. Nine rooms are independent SBUs because they do not belong to any group in this macro region. It can be assumed that rival escape rooms in this macro region have different strategies, and they compete against each other.

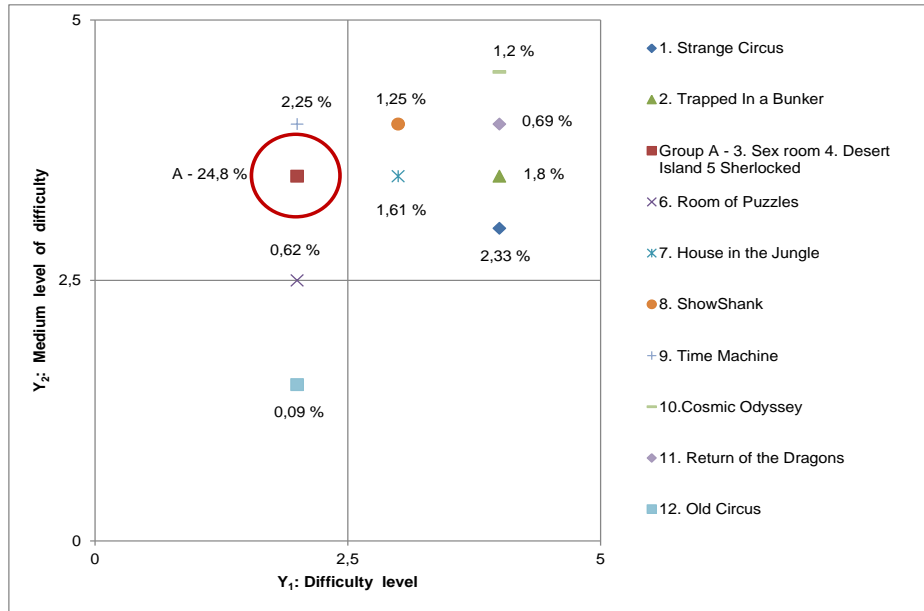


Fig. 7. 1D strategic group map of escape rooms in the Mazovian macro region of Poland

Source: own elaboration based on Lockme.pl

According to the data presented in Figure 8 the analyzed escape rooms in the Northern macro region in Poland are in the convergence field in the evaluation of the difficulty level. On the map there are two strategic groups and seven independent SBUs.

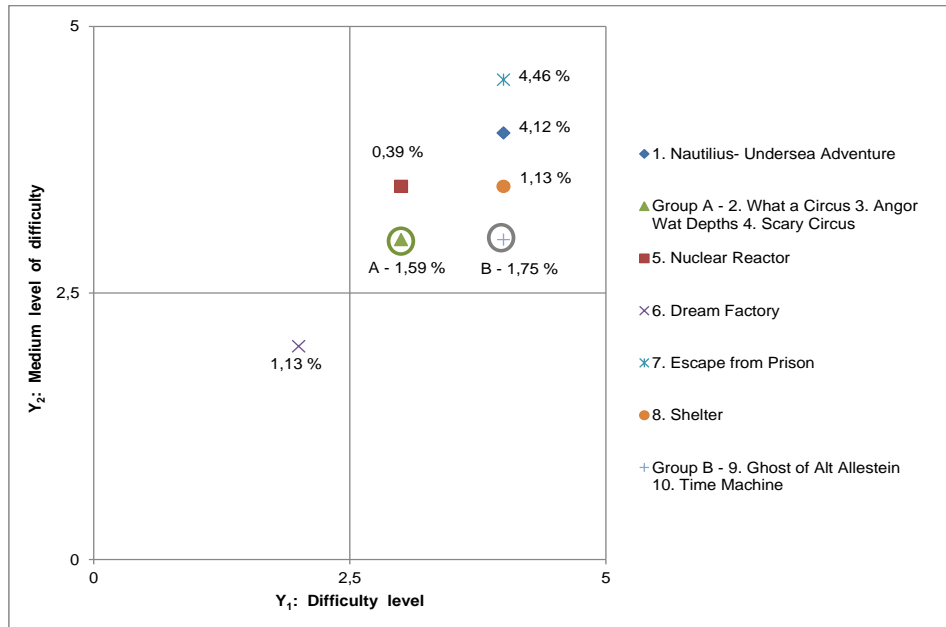


Fig. 8. 1D strategic group map of escape rooms in the Northern macro region of Poland

Source: own elaboration based on Lockme.pl

Group A, consisting of three rooms (What a Circus, Angor Wat Depths, and Terrible Circus), has a market share of 1.59%. In the opinion of the clients the “Escape from Prison” and “Nautilus-undersea adventure” rooms, each with more than 4% share, are more interesting. In the convergence field, there are also two rooms which are independent SBUs, with a market share of, respectively, 1.13% (Shelter) and 0.39% (Nuclear Reactor). In the convergence field there is also group B, consisting of two rooms (Ghost of Alt Allenstein, Time Machine) with the 1.75% market share.

A combined market share in the convergence field is 14.57%. On the basis of the strategic group maps it can be concluded that all escape rooms tested in the northern part of the country have a strategy to a greater or lesser extent adequate to the needs and expectations of clients in terms of the difficulty level.

The research presented in part 6 allowed for positive verification of the research hypothesis which assumed that 1D (one-dimensional) strategic group map can have various applications in strategic analysis.

7. Procedures to be followed in the development of 2D multi-sector strategic group maps and 1D strategic group maps

For the 2D variant of multi-sector strategic group map a procedure consisting of the following stages is proposed.

- a. The selection of variables as differentiation elements in the sector (e.g., for escape room companies in Poland they are: the price of a room, the place of a room in the ranking, its difficulty level).
- b. The selection of variables for the criterion of the geographical area in which the analyzed organizations do their business (e.g. for escape room companies in Poland it can be NUTS1 macro-regions).
- c. The presentation of variables in tables, along with their levels of evaluations (e.g., 1- low; 2 – average; 3-high), or applying a scale for each variable being evaluated.
- d. The assignment of numbers to individual regions of the geographical area (e.g., for escape room companies in Poland 1- the Central macro region; 2- the Southwest macro region; 3- the Mazovian macro region; 4- the Eastern macro region; 5- the Northern macro region; 6-the Northwestern macro region; 7- the Southern macro region).
- e. Drawing up various variants of multi-sector 2D strategic group maps applying coordinate axes (X, Y) with selected pairs of variables and the corresponding scale (e.g., for escape room companies in Poland see figures 2-4).
- f. Putting values from tables on the X, Y axes, with the names or symbols of entities in the analyzed sector.
- g. Illustrating the shares of strategic groups consisting of SBUs in the coordinate system with circles of various diameters. The shares are measured as a percentage of the total number of votes of escape rooms clients.
- h. Using horizontal and vertical interpretation of the results to evaluate the competitive situation in relation to each variable pair in various sectors extracted geographically.

For the variant 1D strategic group map a procedure consisting of the following stages is proposed:

- a. The selection of variables as differentiation strategy elements in the analyzed sector (e.g., for escape room companies in Poland they are: the difficulty level of the room, the average evaluation of difficulty).
- b. The presentation of variables in tables, along with their assignment to their respective level on the scale (e.g., 1-5) .
- c. Drawing up various variants of 1D strategic group maps through positioning selected pairs of variables and corresponding levels based on the evaluations of various stakeholder groups of the sector (e.g., for escape room companies in Poland see figures 6-8) on coordinate axes (Y_1 , Y_2).
- d. The distribution of values from the tables on Y_1 , Y_2 axes, with names or symbols of the entities in this sector.
- e. Illustrating the shares of strategic groups consisting of SBU in the coordinate system with circles of different diameters. The shares are measured as percentage of the total number of votes of escape room clients in each group.

- f. The interpretation of the results in the context of the evaluation of the situation in the sector extracted geographically according to various stakeholder groups.

Conclusions of the analysis and recommendations

Partial analysis of the competitive situation in the escape room sector (separated geographically using NUTS 1) with 2D strategic group maps allows the following conclusions:

- in most (86%) analyzed rooms the minimum prize as differentiation strategy elements is at level 2 (67-133 PLN); in the richest macro regions of Poland: Mazovian, Southwestern and Central, the services of escape rooms are at level 3 of the minimum price (higher than 134 PLN), and in the Eastern and Northern macro regions they are at level 1 of the minimum price (lower than 66 PLN);
- in nearly half (49%) of analyzed rooms the criterion of differentiation strategy showing the place of the room in the ranking is at level 3; in Eastern, Northern, and Southern macro regions of Poland escape rooms are visited by clients posting their opinions on Lookme.pl and encouraging others to use the services;
- the largest group (41.5%) are the rooms with difficulty level 3 as a differentiation strategy element (*for the intermediate*); in all Polish macro regions in principle there are no rooms for the declared levels of 1 and 5 (for those playing for the first time and for proficient players), while rooms *for beginners* (level 2) are the most popular in the Mazovian macro region, with the most complex puzzles (level 4) preferred by clients in the Northern macro region.

Multi-sector 2D strategic groups maps:

- show the competitive position of a local/regional entity in different geographic locations;
- allows making horizontal analysis and drawing conclusions, comparing the competitive position based on selected levels included for testing criteria/variables in different regions/macro regions/countries;
- allows making vertical analysis and drawing conclusions, comparing the competitive position based on one criterion/variable in one region/macro region/international market;
- can be used to draw conclusions from the analysis, on the one hand, adjusting the strategies of analyzed entity/SBU to the specific situation of competitive advantage in competitive conditions, on the other hand, enabling investors to compare their situation to that in other markets and to take decisions concerning amendments to the strategy or changes in their markets.

Depending on who the analysis is made for all sorts of practical conclusions can be formulated. If the analysis is carried out for owners of escape room businesses, a map presenting current situations across macro regions could be a hint at where to locate the investment. The information presented on the maps allows, for example, deciding in which of the macro regions it would be profitable to set up new divisions (rooms), or what marketing strategies, concerning the price, room type, location, level of difficulty, potential clients should be adopted. From the point of view of the investors, the multi sector 2D strategic group maps can be an indication which macro region would be profitable to allocate the money.

Partial analysis of the competitive situation in the escape room sector (separated geographically with NUTS 1) using 1D strategic group maps allows the conclusion that:

- in two analysed macro regions (the Southern, the Northern) escape room strategies match the difficulty level to clients' expectations, taking into account the total value of the market shares from the convergence fields of stakeholder groups;
- in the Mazovian macro region the divergence level in the evaluation of owners and clients is higher, which means that the strategies for game difficulty are not well matched to the expectations of external stakeholders.

The result of the studies and of the use of the variant 1D strategic group maps are conclusions and recommendations concerning this variant. The 1D strategic groups maps:

- facilitate analysis of the competitive position of an entity/SBU at any given point in time (statically), presenting a visual description of the competitive position, evolving or existing, in the specified period;
- can be used for the diagnosis and assisting in decision-making processes useful for people working on the development of an entity/SBU, which allows searching for a sequence of short-term competitive advantages;
- are part of a comprehensive evaluation of the competitive position of the sector, allowing a comparison of objective and subjective evaluations of different stakeholder groups;
- facilitate systematizing knowledge about the degree of the implementation of adopted strategies and about general trends in the sector;
- can inspire managers to change strategies of entities/SBU (e.g., as a result of the evaluation of the competitive situation on the 1D map not satisfying the stakeholders, a map can be a stimulus to change the strategy, as well as to look for the causes of the situation);
- allow individuals responsible for the development of escape room companies to search for answers to questions about the causes of the diagnosed changes and cause-and-effect relationships arising from the situation identified on the map;
- allow determining courses of action for the future with regard to specific criteria;
- compare evaluations of different stakeholder groups, with decision-making bodies being able to correct current activities of the entity;
- can provide a visual representation of individual criteria/variables from the point of view of various stakeholder groups, for example, presenting the evaluation of the difficulty level of individual rooms, the time needed to solve the puzzles, or a need to make the game easier or more difficult.

In this article an analysis of the situation in the sector was carried out only in statistical terms. However, according to the authors, it is possible to use dynamic approach also in relation to the 1D maps (Multan, Wójcik-Augustyniak, 2017). The application of dynamic analysis may facilitate determination whether the right decisions have been taken.

On the basis of the study on escape rooms sector in Poland it can be concluded that the purpose of the article has been achieved. Scientific problem has been solved and the hypothesis '2D (two-dimensional) and 1D (one-dimensional) strategic group maps can have various applications in strategic analysis' has been verified positively.

The main contribution of this article to management sciences is:

- The novelty of using variants of 2D and 1D strategic group maps. Multi-sector strategic group maps (2D) enable comparisons between NUTS. Until now, in management sciences researchers have focused on comparing and presenting companies /organizations in the context of their type of activity, without focusing on comparisons and presentations of the geographical context. Variant 1D allows confronting the opinions of various stakeholder groups.
- The proposed new variants of strategic group maps are tools that support the right strategic decisions of managers of modern organizations, taking into account feedback from stakeholders in their strategies.

In addition, the authors undertook theoretical reflection on strategic group maps, and variants of two-dimensional and one-dimensional group maps were created based on the analysis of the escape rooms sector, which has not been studied in this scope so far.

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Marzena WÓJCIK-AUGUSTYNIAK, habilitated PhD is the Associate Professor at Siedlce University of Natural Sciences and Humanities, Poland, a Chief Editor of "The Scientific Papers of the Siedlce University of Natural Sciences and Humanities, Series: Administration and Management", the Project Team Leader of the Siedlce University at the Project "Certified Digital Accessibility Training" within ERASMUS+ Programme, Member of the Organizational Committee of the International Conference MANAGEMENT.

Research interests: strategic management, including strategic analysis; higher education institutions, value innovation.

ORCID ID: <https://orcid.org/0000-0001-5096-2863>

Ewa MULTAN, PhD, is the Assistant Professor at Siedlce University of Natural Sciences and Humanities, Poland, project manager of "Competences of tomorrow's employees in the business services sector" project of the National Research and Development Center co-financed by the European Union. Leader of "Liga Menedżerów Biznesu" (Business Managers League), a nationwide competition; leader of "Synergia nauki i biznesu" (Business and Science Synergy) conference; Research interests: strategic management including strategic analysis, network analysis, academic entrepreneurship.

ORCID ID: <https://orcid.org/0000-0003-4855-0645>

Register for an ORCID ID:

<https://orcid.org/register>

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THE IMPACT OF MEGA-EVENTS ON URBAN SUSTAINABLE DEVELOPMENT

Gulnar Mirzayeva¹, Oguz Turkay², Nurkhodzha Akbulaev³, Fariz Ahmadov⁴

^{1, 3, 4} Azerbaijan State University of Economics-UNEC, Economy and Business, Abbas Sahhat str., 45a, Baku, Azerbaijan

¹ Sakarya University of Applied Sciences, Tourism Management, Camicedit/Pasha str., No:16, Sapanca/Sakarya, Turkey

² Sakarya University of Applied Sciences, Gastronomy and Culinary Arts, Camicedit/Pasha str., No. 16, Sapanca/Sakarya, Turkey

⁴ Azerbaijan State University of Economics-UNEC, International Center for Graduate Education, Abbas Sahhat str., 45a, Baku, Azerbaijan

E-mails: ¹gulnarmirzayeva@unec.edu.az,

¹ gulnarmirzayeva8@gmail.com, ²turkay@subu.edu.tr, ³ nurhodja_akbulayev@unec.edu.az, ⁴ f.ahmadov@unec.edu.az

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Abstract. Mega-events have different types of effects for host cities or countries. The purpose of this paper is to identify the impact indicators of the Formula 1 Grand Prix in Baku, Azerbaijan from the perspective of tourism stakeholders and to investigate the effects of these impacts on the urban sustainability through the perceptions of stakeholders after the Formula 1 Grand Prix. The results indicated that environmental and social impacts exerted significant positive effects on urban sustainability. All positive dimensions of economic impact exerted significant positive effects on urban sustainability and 'prices rising' negative dimension exerted nonsignificant effects on urban sustainability. The results showed that except 'tourism infrastructure development' other positive dimensions (infrastructure development, protection of natural resources and cultural heritage) of environmental impact and only 'social welfare' positive dimension of social impact exerted significant positive effects on urban sustainability. This research contributes to policymakers by revealing the impacts of mega-events on urban sustainable development.

Keywords: urban sustainability; mega-events; stakeholders' perceptions; sustainable development

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JEL Classifications: O11, O22.

1. Introduction

Sustainable development is the current imperative of the economic system's structural rearrangement. Consequently, an increase of the world countries' competitiveness is correlated with the economic growth, modernization of the economy and society in accordance with the socio-economic indicators of sustainable development (Dalevska, Khobta, Kavilinski, Kravchenko, 2019; Prakash, 2019). Mega-events have taken pride place in the urban agenda of contemporary metropolises. This current importance lies in the fact that the mega

event be viewed as a catalyst for urban development of a metropolis, and an opportunity for affirmation them as global cities (Menezes and Souza, 2014). Mega-events play a major role in the development and marketing strategies of most destinations and are increasingly considered crucial for enhancing destination competitiveness. Mega-event research has steadily grown in number and diversity because of the tremendous influence of mega-events on the economy and image of host destinations (Lee, Lee, Park, 2014; Getz, 2008).

According to Hall (1992) cities and countries strongly compete for the chance of hosting events such as the Olympic Games, FIFA World Cup or a World Expo, because these events, have not only attracted an increasingly global audience, also seem to have shaped world tourism patterns, highlighting new tourism destinations (Fourie and Gallego, 2011).

From the moment the host country decides to bid for the event to the time of selection and throughout the preparation for the event hosting, there are opportunities to leverage the event to achieve long term goals. Event leveraging is defined as efforts to take advantage of potential development opportunities a mega sport event can bring in a number of areas such as economic, tourism, socio-cultural, environmental, sport and health (Kaplanidou, Emadi, Sagas, Diop, Fritz, 2016). The "Barcelona model" is constantly cited as the best example of use of a mega event as leverage for urban transformation and urban marketing to promote the city's image to the point of being considered a global city making it mandatory route of thousands of tourists every year (Menezes and Souza, 2014).

Whilst a megaevents occur over only few weeks, the preparation for them takes place over a number of years. A broad range of stakeholders contribute to these preparations, with a need to balance the desire of showcasing the city whilst maintaining as much continuity as possible for the resident population. A core element of this continuity involves the maintenance of the transport system to ensure the effective movement of goods and people around the city (Parkes, Jopson, Marsden, 2016).

Mega-event impact studies have concentrated largely on economic outcomes. At the same time, in a few studies economic, social and environmental impacts of mega-events were investigated together. The current study makes significant contributions to the literature and focuses on economic, social and environmental impacts of mega-events on sustainable development.

2. Literature Review

The future of contemporary society will be increasingly 'urban'. Cities are the main ground where 'the match' of social and economic development is being disputed (Maiello and Pasquinelli, 2015). Recent years have seen growing academic interest in the urban aspects of mega-events, especially with respect to their role as catalysts for mega-projects, magnets for investors and tourists and instruments of city marketing. Urban research on mega-events is generally concerned with the socio-spatial implications of event-led redevelopment, the impacts of mega-events on local politics and public policy, the economic legacy of mega-events and their role in city marketing (Broudehoux, 2017).

Hosting mega-events has significantly stimulated urban infrastructure investment and boosted urban transformation. Mega-events are events that draw substantial numbers of individuals to a location, placing the local environmental and infrastructure under great pressure, and bringing disruption to residents (Wu, Xun, Lin, 2016). Reports in favor of investment in an event generally overstate the benefit of job creation, too. Hosting an event will certainly present a need for labor for construction of event-related infrastructure, administration of the event's activities, maintenance of grounds and facility, security, and to prepare and sell a wide range of food, beverages, and souvenirs. The Sports Management Research Institute estimated the direct economic benefits of the U.S. Open Tennis tournament in Flushing Meadows, New York at \$420 million for the tri-state area, more

than any other sports or entertainment event in any city in the United States. This sum represents 3% of the total annual direct economic impact of tourism for New York. The projected \$6 billion impact of the World Cup proposed for South Africa in 2006 suggested that soccer games and their ancillary activities would have represented over 4 percent of the entire gross domestic product of the country in that year (Matheson, 2006). Of course, there is an opportunity cost of creating new jobs for a mega-event: investment in some other public project or goal done with the potential for more robust levels of economic development-would also create jobs. Many of those would be permanent and thus the aggregate long-term demand for labor could be greater than what exists when a mega-event is held. It is extremely important to understand whether mega-events in developing countries can represent a stimulus for community participation in tourism development. In recent years several mega-events have been awarded to developing countries, in part to support or celebrate their development: For instance, 2010 Football World Cup (South Africa), 2012 European Football Cup (Poland and Ukraine) and 2012 Expo (Yeosu) (Lamberti, Noci, Guo, Zhu, 2011).

Urban development is understood as both a process of economic, spatial and social progress and a means whereby local governments formulate and execute public policies for economic growth (Wu et al, 2016). The Brundtland Commission's (The World Commission on Environment and Development) 1987 report entitled *Our Common Future* "led directly to the term 'sustainable development' passing into policy discourse, if not into everyday language". The report provides two such normative definitions. The first is often termed the *Our Common Future* definition, is explicitly defined sustainable development as development that meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED, 1987; Redclift, 2005; Morse, 2008). The second, known as the "Three Pillars of sustainability" was implicitly identified within the report as a broader objective to link economic, social and environmental concerns (Abrahams, 2017).

Mega events have assumed a key role in urban and regional tourism marketing and promotion and in wider urban and regional development strategies. Although mega-events are generally built around non-tourism objectives (such as sport or cultural goals), public bodies are increasingly regarding them as a formidable instrument for the development of tourism. Mega-events are one-time events that typically generate profound positive and negative long-term impacts on host communities (Liang, Wang, Tsaur, Yen, 2016; Lamberti et al, 2011). Finally, mega-events are defined as large-scale, short-term and high-profile urban events which function as an engine for urban development (Wu et al, 2016).

Every mega-event hosted in a community usually has direct social and cultural impacts on the host community. Mega-events have the ability to intensify community pride, introduce new and challenging ideas and also help to revitalize the traditions of the host community. Major events can sometimes create unintended consequences which can hijack the agenda and determine the way the public perceives the event if not managed properly. Such consequences can be in form of substance abuse, bad behaviour by crowds and the increase in criminal activities (Etiosa, 2012). Events can cause unwelcome incursions and disruptions to the lives of locals. Further, since events concentrate large number of people into a small area, and require significant travel, there are ongoing concerns about their environmental footprint (Grix, 2014; Ekber and Mirzayeva, 2017). Events can also impact on the social life and structures of communities in various ways. An example of which can be car traffic which may impede the access to resident's homes, loss of amenities, cost inflation of goods and services, which can raise housing markets thereby impacting on the low-income groups (Allen, O'Toole, Harris, McDonnell, 2010)

It is worth noting in this case, the concern with creating environments that meet the diversity of individuals who reside in or visit the city in question. In this context, it is worth mentioning the example of the city of Barcelona where the 1992 Summer Olympic and Paralympic Games had a special significance in the struggle for the rights of Persons with Disabilities – DP (Pereira, Albuquerque, Portugal, 2014).

Mega-events are also associated with various environmental impacts due to the vast amounts of construction materials, energy and resource use, waste generation, air and noise pollution during the construction of the event site, staging the event and post-event site redevelopment and operation. Environmental strategies for the mega-events have recently become a fundamental part of the overall events' sustainability management plans. Typically, they specify the actions that are going to be implemented in order to minimise negative environmental impacts resulting from the preparation and staging of the event (Parkes, Lettieri, Bogle, 2016). Many of the event impacts can be characterized as tangible and intangible (Kaplanidou & Karadakis, 2010; Preuss, 2007). Among the tangible impacts, infrastructure development is the most characteristic example, while the intangible impacts often involve development of social capital (Gibson et al., 2014) and expanded business networking (Kaplanidou et al, 2016).

There is a twofold level of impact of mega-events on the hosting community: on the one hand, a mega-event impacts on the community as (i) it attracts a significant amount of public resources to build infrastructure, potentially modifying the environment, (ii) it leads to international exposure and media scrutiny, and (iii) by hosting large numbers of tourists, it generates a possible cultural contamination that is intrinsically linked to the significant opening up of an area towards tourism required by the event. On the other hand, mega-events are expected to generate economic externalities, such as the development of companies and organisations directly or indirectly serving the mega-event, and also non-economic impacts in the form of cultural legacies, variations to tourism culture and to the community's national and international perceptions (Lamberti et al, 2011).

Some scholars believe that the mega event only serves to exacerbate social problems and differences between residents of the host city, and they see the event as a strategy for urban renewal revolves around the discussion about who will benefit and that rare occasions result in some improvement for citizens. Other authors believe that the mega event allows the creation of an urban system capable of accelerating growth in the urban agenda and define it as a catalyst for urban transformation (Menezes and Souza, 2014).

Mega-event impact studies have concentrated largely on economic outcomes (Werner, Dickson, Hyde, 2015). Fourie and Gallego's (2011) research result implies that by hosting a mega-sport event countries would increase their tourist arrivals by 8.1%. The Expo 2012 Yeosu Korea attracts about 8.2 million visitors from 104 countries, has an economic effect of USD 11.09 billion, and creates 79,000 employees (Lee et al, 2014; Akbulaev and Mirzayeva, 2020). There is also another important aspect associated with mega-events that a cost-effectiveness evaluation must consider. The need for a subway in Athens, for example, or an enhanced airport with improved roadway connections to the central city were recognized long-before a proposal for the Olympics was formulated. The existence of the games and the desire to make them successful sometimes creates the political will to satisfy long-standing infrastructure needs (Mills and Rosentraub, 2013). During the last ten years Rio has been hosting not only sport events, but also other mega-events, such as the 2012 Rio + 20 and the 2013 World Youth Day. This series of large-scale events has been determining the urban development agenda for over a decade, with social and economic impacts not just on Rio but also on the whole country (Maiello and Pasquinelli, 2015). Absalyamov's (2015) research result implies that cultural, entertainment and sports international events have a much greater sustainable positive impact on the socio-economic situation in the host-regions. Absalyamov's (2015) research results show that:

- ✓ International mega-events have influence on individual sectors of the economy and social life of the host countries;
- ✓ Large global events positively affect the level of foreign economic activity and the dynamics of economic development;
- ✓ Mega-events have a positive impact on the preservation of cultural heritage.

The findings of Caiazza and Audretsch's (2015) study demonstrates that; 'Respondents indicated that after the event, the level of interest had decreased. Before the games, residents held some expectations of the economic, socio-cultural and political benefits for their communities, although they were aware of the fact that these benefits would come with a cost. Consequently, residents treated the outcomes as losses because they were not significant enough to justify the expense'. Although sporting events may make a great contribution to positive publicity or to the image of city tourism policymakers should understand that residents are more concerned about their day-by-day problems related to employment and crime.

According to the study results of Ntloko and Swart (2008) 73.5% agreed that the event provided a chance to meet new people, increases entertainment opportunities for locals (68.5%), provided an opportunity to have fun with family and friends (65%) and provided an opportunity to attend an interesting (62%). These results show that the event has an entertainment value. Nearly half of the respondents (47.5%) agreed to strongly agreed that only some members of the community benefited from the event, while 53.5% agreed to strongly agreed that the event increased interaction between locals and tourists.

The study results of Kim, Gursoy and Lee (2006) showed that all positive dimensions (i.e. economic benefits, investment benefits, and consumer habits) of economic impact exerted significant positive effects on urban sustainability, whereas all negative dimensions (i.e. rising prices and wasted investment) exerted nonsignificant effects on urban sustainability. The statistics showed that all dimensions (i.e. infrastructure development, tourism infrastructure development, protection of natural resources and cultural heritage, and energy conservation) of environmental impact exerted significant positive effects on urban sustainability. The statistics showed that all dimensions (i.e. community development, service and reception, and social welfare) of social impact exerted significant positive effects on urban sustainability.

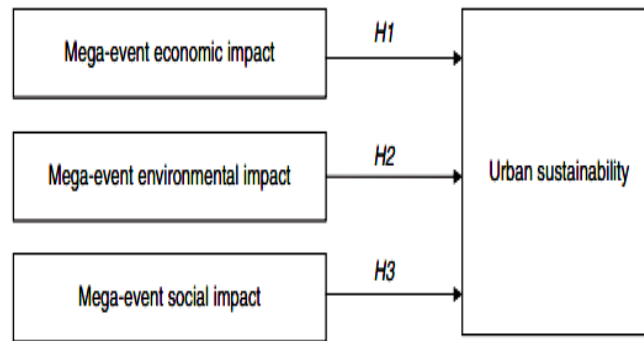
Urban sustainability can be measured from the aspects of ecological sustainability, water resources use, economic efficiency, resource self-sufficiency, environmental loading, living comfort, transport efficiency, environmental management, social welfare and public safety, and education. Mega-event generates numerous positive and negative impacts for the host city (Kim et al., 2006; Zhou and Ap, 2009). These positive economic, environmental, and social impacts are beneficial for urban sustainability. For example, positive economic impact may increase the economic efficiency and resource self-sufficiency for the hosting city. Positive environmental impact may promote the ecological sustainability, water resource use, environmental loading, transport efficiency, and environmental management for the hosting city. Positive social impact may enhance the living comfort and social welfare and public safety (Liang et al, 2016).

Therefore, in this research, based on literature review we infer that a mega-event creates both positive (economic benefits, investment benefits, infrastructure development, community development etc.) and negative impacts (prices rising, wasting investment etc.) on the host city. These effects can be evaluated regarding economic, environmental, and social impacts according to long-term effects, and positive mega-event impacts positively affect urban sustainability. Thus, based on previous research results the following hypotheses were proposed:

- H1. Positive mega-event economic impact positively affects urban sustainability
- H2. Positive mega-event environmental impact positively affects urban sustainability
- H3. Positive mega-event social impact positively affects urban sustainability

The hypothesised framework for this analysis is presented in Figure 1. The effects of mega event impacts on the urban sustainability are encapsulated in H1-H3.

Figure 1. Hypothesised framework



3. Research methodology

3.1. Questionnaire design and variables

In order to achieve research objectives, the authors conducted a literature review and prepared a new scale based on previous scales. This process resulted in 14 indicators of economic impact, 10 indicators of social impact, 9 indicators of environmental impact and the authors developed a 10-dimension/33-indicator mega-event impact measurement scale. A five points Likert scale was used to measure variables with assigned value ranking from highest to lowest 5 "strongly disagree" to 1 "strongly agree".

3.2. Sample selection and data collection

Semi-structured interviews were the focal source in this research and a formal online survey complemented the findings. The 71 stakeholders represented key hotels, travel agencies, restaurants/coffees and entertainment centres of Baku. In this article judgment sampling is used. A judgment sample is a type of nonprobability sample, which is selected on the basis of knowledge of a subject matter expert with knowledge of the process being studied (Perla and Provost, 2012:171). In this research were selected the companies which increased occupancy rate and revenues during the Formula 1 Grand Prix event. The whole sample was tried to be reached. The interviewees' job positions ranged from higher-level decision-makers in their organizations such as General Secretary, CEO and director, to middle management positions like managers and department heads. A total of 71 semi-structured interviews were conducted face to-face or via phone.

The phone response to the questions provided some insights but it was not as rich as the face to face interviews. Interview locations were chosen according to the availability of the interviewees. The interviews were informed about mega-events' impacts and urban sustainable development. Interview questions were developed after an extensive review of the relevant literature review. The interviews were audio-taped and notes were taken to capture important thoughts. Examples of the interview questions include 'How has Formula 1 Grand Prix impacted on occupancy rate in the organization?' and 'How has Formula 1 Grand Prix impacted on revenue?'.

Within a few days after their post-event interview, all 71 participants received a link to participate in a relevant online survey. We excluded 1 invalid questionnaires, resulting in 70 valid responses. Seventy surveys were evaluated. The survey questions were drawn from the study of Liang et al. (2016). To ensure measurement validity of the original scale, a dichotomous pilot test was conducted by 12 experts, who had researched or

handled the case of the mega-events, to determine whether these indicators were suitable. The reliability of the original scale was 0.845. Prior to conduct to the real survey, a pilot study of 17 participants was done before a few weeks earlier from opening Formula 1 Grand Prix to ensure that the research instrument is suitable for respondents to gather data. For pilot testing was selected seven hotels, four travel agencies, 4 restaurants and 2 entertainment centres. After pilot testing consumer habits, energy conservation dimensions and enhanced innovation, enhanced pride of residents, enhanced reception standard, water resources utilisation, resource self-sufficiency indicators were removed from the survey. Data were collected between June and July 2019.

4. Findings

The respondents included 70 per cent men, and 60 per cent of the respondents were married. Most respondents (52.9 per cent) were university educated (bachelor degree), and 31.4 and 25.7 per cent of them were 40-49 years of age and 50-59 years of age, respectively. According to the interview results, occupancy rate increased between 5 per cent and 20 per cent. Data gathered from the interviews indicates that the mega-events such as Formula 1 Grand Prix that are held in Baku provide a wide range of economic opportunities. The majority of the interviews indicated that these events increased revenue between 10 per cent and 25 per cent. Overall, 93 per cent of the interviews thought that mega-events were beneficial to their businesses and they want these events to continue.

The reliability was tested by SPSS software, the result of Cronbach's Alpha was 0.875. Tables 1-3 indicate that all of the measures were reliable, with Cronbach's α values greater than 0.70, conforming to the internal consistency criteria (Liang all. 2016). The Cronbach's α value of economic impact (0.77) was lower than environmental impact (0.85) and social impact (0.84) were.

The mega-event economic impact statements outlined in Table 1 indicate a high level of agreement for "increased number of tourists" (M=4.73) and "increased tourism revenues" (M=4.64). Respondents expressed a high level of agreement towards the "prices rising" dimension (M=4.52). Items with lower mean scores were associated with "increased tax revenues" and "improved business investment".

Table 1. Descriptive statistics and reliability of mega-event economic impact

Items	Mean	Std. Deviation	Cronbach's α
<i>Economic impact</i>			0.77
<i>Dimension 1: economic benefits</i>			0.76
Increased employment opportunities	4.01	0.71	
Increased economic growth	4.58	0.49	
Increased tax revenues	3.51	0.58	
Increased number of tourists	4.73	0.44	
Increased tourism revenues	4.64	0.48	
<i>Dimension 2: investment benefits</i>	4.04	0.48	0.71
Improved business investment	3.80	0.73	
Increased business opportunities	4.01	0.71	
Improved public investment	4.14	0.68	
Increased commercial activities	4.20	0.71	
<i>Dimension 3: prices rising</i>	4.52	0.48	0.92
Increased prices of goods and services	4.48	0.50	
Increased prices of real estate	4.56	0.50	

<i>Dimension 4: wasting investment</i>	4.30	0.42	0.70
Increased financial burden	4.58	0.49	
Increased unused facilities	3.86	0.70	
Increased budget pre-emption	4.45	0.50	

The mega-event environmental impact statements outlined in Table 2 indicate a high level of agreement towards “improved city appearance” (M=4.78), “increased leisure facilities” (M=4.77) and “improved city road condition” (M=4.77). Respondents perceived a high level of agreement towards the tourism infrastructure development dimension (M=4.30). Items with lower mean scores were associated with “enhanced and improved sanitation facilities” and “increased number of hotel rooms”.

Table 2. Descriptive statistics and reliability of mega-event environmental impact

Items	M	SD	Cronbach's α
<i>Environmental impact</i>			0.85
<i>Dimension 1: infrastructure development</i>	4.23	0.32	0.71
Improved city appearance	4.78	0.42	
Improved city road condition	4.77	0.42	
Enhanced and improved sanitation facilities	3.14	0.35	
<i>Dimension 2: tourism infrastructure development</i>	4.30	0.32	0.69
Increased tourist information facilities	4.18	0.54	
Increased leisure facilities	4.77	0.42	
Increased number of hotel rooms	3.94	0.65	
<i>Dimension 3: protection of natural resources and cultural heritage</i>	4.22	0.39	0.87
Enhanced efforts of preserving natural resources	4.18	0.39	
Enhanced efforts of preserving cultural heritage resources	4.18	0.42	
Enhanced the efforts of the restoration of historical buildings	4.28	0.48	

The mega-event social impact statements outlined in Table 3 indicate a high level of agreement for “increased entertainment opportunity” (M=4.78) and “increased events and activities” (M=4.77). Respondents expressed a high level of agreement towards the “social welfare” dimension (M=4.64). Items with lower mean scores were associated with “enhanced community consciousness”.

Table 3. Descriptive statistics and reliability of mega-event social impact

Items	M	SD	Cronbach's α
Social impact			0.84
<i>Dimension 1: community development</i>	4.40	0.32	0.86
Enhanced community consciousness	3.92	0.63	
Enhanced community development	4.60	0.49	
Enhanced public affair participation	4.61	0.49	
<i>Dimension 2: service and reception</i>	4.50	0.44	0.86
Enhanced spirit of hospitality	4.56	0.50	
Enhanced service quality	4.46	0.50	
Enhanced visitor satisfaction	4.50	0.50	
<i>Dimension 3: social welfare</i>	4.64	0.38	0.85
Enhanced quality of life	4.43	0.49	
Increased entertainment opportunity	4.78	0.42	
Increased events and activities	4.77	0.42	
Enhanced satisfaction with facilities	4.60	0.49	

Finally, the urban sustainability statements outlined in Table 4 indicate a high level of agreement of “transport efficiency” (M=4.46) and “living comfort” (M=4.43). Items with lower mean scores were associated with “ecological sustainability” and “education” indicators.

Table 4. Mean, standard deviation, and reliability of urban sustainability

Items	M	SD	Cronbach's α
Urban sustainability			0.83
Ecological sustainability	4.19	0.52	
Economic efficiency	4.24	0.46	
Environmental loading	4.20	0.52	
Living comfort	4.43	0.49	
Transport efficiency	4.46	0.50	
Environmental management	4.23	0.42	
Social welfare and public safety	4.24	0.62	
Education	4.17	0.48	

5. Results for hypotheses testing

All hypothesised effects were tested using regression equations. Means of dimensions and constructs were used to estimate the effects of mega-event impacts on the urban sustainability. We used four models to test H1-H3. First, after estimating Model 1, we regressed urban sustainability on the dimension of mega-event economic impact to test H1. The result demonstrated that “economic benefits” ($\beta=0.906$) and “investment benefits” ($\beta=0.266$), exerted significant positive effects on urban sustainability ($R^2=0.307$, $F=8.625$). Thus, H1 was partially supported. Second, for Model 2, we regressed urban sustainability on the dimension of mega-event environmental

impact to test H2. The analysis results for Model 2 showed that “infrastructure development” ($\beta=0.321$) and “protection of natural resources and cultural heritage” ($\beta=0.620$) exerted significant positive effects on urban sustainability ($R^2=0.466$, $F=21.071$). Thus, H2 was partially supported. Third, for Model 3, we regressed urban sustainability on the dimension of mega-event social impact to test H3. The analysis results for Model 3 showed that “social welfare” ($\beta=0.540$) exerted significant positive effects on urban sustainability ($R^2=0.294$, $F=10.572$). Thus, H3 was partially supported. Eventually, mega-event economic impact, environmental impact, and social impact were incorporated into the regression model as independent variables to assess Model 4. The analysis results showed that mega-event environmental impact ($\beta=0.368$), and mega-event social impact ($\beta=0.482$) exerted significant positive effects on urban sustainability ($R^2=0.585$, $F=33.401$). Consequently, the results suggest that mega-event environmental impact and social impact are critical predictors of urban sustainability. Table 5 summarises the results of all models for predicting urban sustainability.

Table 5. Regression results for predicting urban sustainability

Independent variables	Model 1 (Std β)	Model 2 (Std β)	Model 3 (Std β)	Model 4 (Std β)
<i>Economic impact</i>				
Economic benefits	0.906**			
Investment benefits	0.266**			
Prices rising	0.073			
Wasting investment	-0.759**			
<i>Environmental impact</i>				
Infrastructure development		0.321**		
Tourism infrastructure development		-0.012		
Protection of natural resources and cultural heritage		0.620**		
<i>Social impact</i>				
Community development			-0.122	
Service and reception			0.142	
Social welfare			0.540**	
Economic impact				-0.025
Environmental impact				0.368**
Social impact				0.482**
R^2	0.307	0.466	0.294	0.585
F	8.625	21.071	10.572	33.401

6. Results and Conclusions

The reason for the interview was to identify companies with increased revenues and occupancy rate during the Formula 1 Grand Prix. The number of respondents is low because in this research was selected only the companies which increased occupancy rate and revenues during the Formula 1 Grand Prix event, but the research reveals important findings. The mean values of all dimensions and indicators were between neutral (3) and agree (4). Respondents identified these indicators for mega-event impact of the Formula 1 Grand Prix and urban sustainability of Baku city. The “increased number of tourists” was the indicator for which the mean value was 4.73 higher than agree (4). This showed that the increased number of tourists made a profound impression on Baku tourism stakeholders after the Formula 1 Grand Prix because it was a short-term phenomenon. For economic impact, the respondents perceived that the Formula 1 Grand Prix carries the potential to make substantial and lasting contributions, both positive and negative, to host destinations. For example, the majority of respondents perceived economic benefits and investment benefits from the event but suffered from rising prices and wasted investment. The mean values of indicators for prices rising and wasting investment were higher than the indicators for investment benefits. Respondents expressed positive impressions of the event for environmental

impact and social impact. The statistics showed that positive dimensions (i.e. economic benefits, investment benefits) of economic impact exerted significant positive effects on urban sustainability, whereas all negative dimensions (i.e. rising prices and wasted investment) exerted nonsignificant effects on urban sustainability. Increased numbers of tourists and tourism revenues were the most significant indicators for mega-event economic impact. The statistics showed that dimensions (i.e. infrastructure development, protection of natural resources and cultural heritage) of environmental impact exerted significant positive effects on urban sustainability. Because certain indicators, such as improved city appearance and city road conditions and restored cultural heritage and historical buildings, are explicit works that are easily perceived by Baku residents and tourism stakeholders. The statistics showed that only one dimension (i.e., social welfare) of social impact exerted significant positive effects on urban sustainability, whereas dimensions (i.e. community development, service and reception) exerted nonsignificant effects on urban sustainability.

Impact studies of mega-events have recently focused on sustainability and their social, economic and environmental dimensions. In sum, statistics showed that only positive dimensions of economic, social, environmental impacts exert significant influences on urban sustainability (Jago et al, 2010; Deery and Jago, 2010; Kim et al, 2010; Fourie and Spronk, 2011; Lorde, Greenidge and Devonish, 2011; Ma et al, 2011). Compared to previous studies, in this research, the results suggest that mega-event economic impact is not critical predictor of urban sustainability. Hosting the mega-event is viewed as symbolic of the renewed strength of the city if the government can provide an enhanced vision of how to use these facilities afterwards. Unfortunately, mega-events have negative effects such as prices rising, wasting investment. Despite the potential for negative effects, decisions for hosting mega-events in the city are often made to benefit urban residents. Therefore, the government is encouraged to host mega-events if certain appropriate measures can be put into practice to address and reduce resident concerns regarding wasting investment, construction costs, overcrowding in public facilities, possible price increases (increased prices of goods and services, increased prices of real estate), and traffic congestion, all of which were observed to be the primary indicators determining the negative perceptions of residents.

The hosting of a mega-event should not be seen as an “end in itself” but rather part of a longer-term development plan or positioning strategy. Mega-events are an important way to catch social, economic, environmental goals and provide benefits for the societies and destinations. These events and activities improved city appearance and city road conditions and restored cultural heritage and historical buildings, enhanced and improved sanitation facilities, enhanced service quality, increase entertainment opportunities and activity participation for community residents, and enhance their quality of life and satisfaction with facilities, further providing higher social welfare. On the other hand, it affected residents lives negatively. Therefore, we strongly recommend that future mega-event host cities and tourism stakeholders take into consideration negative effects of mega-events. It is critical to calculating infrastructure investment to avoid wasting investment. Mega-events frequently face transport challenges which can have massive environmental impacts. Host cities have to reduce transport challenges. Hosting sports mega-events can create a great amount of waste and pollution. It is necessary to take measures to avoid such negative consequences, which otherwise can be detrimental in the long term to the wider host city environment. Therefore, event planners and city governments need to react proactively to this challenge.

At a time when public and private agencies recognise the importance of sustainable development, the economic, social and environmental impacts of mega-events are commanding increasing attention. Therefore, the current research contributes to the literature. Previous studies was limited to only one evaluated channel of resident perceptions. The evaluation and analysis of stakeholders contribute substantially to an enhanced understanding of impact and sustainability. The current study makes significant contributions to knowledge and practice in this field. First, this study evaluated mega-event impact and urban sustainability through stakeholder perceptions. Second, this research contributes to policymakers by revealing the impacts of mega-events on urban sustainable development. Third, our current research demonstrated negative impacts of mega events and policymakers who

plan to host large events are likely to generate large economic, social and environmental benefits by reducing negative impacts of mega-events. Finally, the mega-event positive economic impact statements outlined in research indicate a high level of agreement, so the results of the research might encourage the government to bid and host mega-events.

7. Research suggestions

A multi-source measurement from stakeholders including residents, visitors, policymakers and the government would make the impact and sustainability assessment more reasonable and applicable. We strongly recommend that future studies take into account this suggestion and adopt multi-source measurement. Moreover, some variables (for example, enhance construction of infrastructure and improve road condition for the disabled, to ensure the participation of disabled people, improve social responsibility during mega-events, increase green labels and increase green purchases in developing countries) that may affect the residents' perception of urban sustainability or moderate the relationship between mega-event impact and urban sustainability are not included in this study. Future studies may consider these variables to provide more sophisticated evidences about how megaevent impacts affect urban sustainability.

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Gulnar MIRZAYEVA

ORCID ID: 0000-0002-4531-1000

Oguz TURKAY

ORCID ID: 0000-0002-0752-6799

Nurhodja AKBULAEV

ORCID ID: 0000-0003-4271-9550

Fariz AHMADOV

ORCID ID: 0000-0003-2042-9018

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ADVANCES IN THE IMPLEMENTATION OF THE MODEL OF SUSTAINABLE HUMAN RESOURCE MANAGEMENT: POLISH COMPANIES' EXPERIENCES*

Edyta Bombiak

*Faculty of Social Sciences, Siedlce University of Natural Sciences and Humanities,
2 Konarskiego, 08-110 Siedlce, Poland*

E-mail: edyta.bombiak@uph.edu.pl

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Abstract: Sustainable development is a modern idea of civilization development born out of the need to mitigate and prevent adverse effects of economic activity. Its implementation forces the necessity to change the philosophy of managing organizations by including social and ecological goals in their strategy. Significant support for the implementation of the strategy aimed at achieving the above-mentioned objectives is the concept of Sustainable Human Resource Management. This is due to the fact that personnel processes play an important role in translating sustainable development policy into practice. The purpose of the research is to systematize knowledge regarding sustainable human resource management and to evaluate the scope of practical implementation of the new model of the HR function in Polish Enterprises. The research used a critical analysis of the literature and a diagnostic survey method. The survey was conducted among a random, representative population of 300 Polish enterprises. In the course of the study, it was established that in Polish conditions the model of Sustainable Human Resource Management is implemented in a fragmented way.

Keywords: HR Function; Sustainable HRM; Green HRM; Socially Responsible HRM

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JEL Classifications: M12, M14, Q56, 015

Additional disciplines: ecology and environment

1. Introduction

Sustainable development in general is a continuous process of satisfying needs of the present and future generations (Baltgailis, 2019; Vigliarolo, 2020). The idea of sustainable development, viewed as the company's ability to achieve goals and increase the long-term value for the shareholder via economic, environmental and social integration in business strategies, have become vital to the operations of contemporary organizations. The

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concept of sustainability encourages enterprises to implement the sustainable development business model based on the principles of management rooted in value and social responsibility (Jabłoński, Jabłoński 2016), where the HR function may occupy a key role. Human resources management (HRM) is of primary importance for an effective implementation of the principles of sustainable development. HRM strategies create a framework for sustainable development culture by raising employee awareness and shaping desired social-friendly and environment-friendly attitudes (Shama, Sharma, Devi 2009). The recruitment of suitable staff members, the assignment of tasks compliant with the requirements of sustainable development, the conduct of sustainability-related training, and the monitoring of sustainability performance may have a significant effect on the execution of the concept of sustainable development in companies (Mazur 2014).

Becoming aware of this fact translates into an increase in interest in the issue of sustainable human resource management (SHRM) (Jabbour and Santos 2008; Ehnert and Harry 2012; App, Merk, Büttgen 2012; Kozica and Kaiser 2012; Diaz-Carrion et al. 2018). Nonetheless, despite the above, the concept is still pioneering (Stankevičiūtė, Savanevičienė 2018a), whereas the analysis of literature clearly indicates that there is a gap, both in terms of model coherence and empirical research (Mazur 2015; Ehnert et al. 2016). The study intends to bridge this gap, partially at least.

The purpose of the research is to systematize knowledge regarding sustainable human resource management and to evaluate the scope of practical implementation of the new model of the HR function. The method used to meet the objective was a critical review of source literature and a diagnostic survey method. The author contributes to the body of theoretical research on sustainable human resource management and popularizes the SHRM model across organizations.

2. Materials and Methods

The subject matter of the research were environment-friendly and society-oriented human resource practices implemented across Polish enterprises. The purpose of the research is to systematize knowledge regarding sustainable human resource management and to evaluate the scope of practical implementation of the new model of the HR function. The method used to meet the objective was a critical review of source literature and a diagnostic survey method. To achieve the research objectives, the following research questions were set:

- What are the main pillars of Sustainable Human Resource Management?
- How advanced is the implementation of the SHRM model in Polish enterprises?

This study was based on the main research hypothesis that the SHRM model in Polish enterprises is implemented in a limited scope.

In the first stage of research author carried out a systematic literature review. This review considers the research works on and related with 'sustainable HRM' appeared in the literature. This review has used the archival method for data collection, because it enabled the researchers to structure research and builds a reliable knowledge base on existing literatures on and related with sustainable HRM (Thevanes and Arulrajah 2017). On the basis of the literature review, a comparative analysis of SHRM models was carried out.

In the second stage of the study, the results of empiric studies were presented. The survey was conducted in 2018 with the use of the CATI technique among a random, representative population of 300 enterprises. The study sample was selected on a layer basis. First, 50 entities from each of the six Polish regions were drawn: Central, South, East, North-West, South-West and North. The survey targeted individuals in charge of human resource policy development in the enterprises studied. The characteristic features of the study population are shown in Table 1.

Table 1. Details of enterprises covered by the research

Criterion	Number of Enterprises	Percentage
Employment number:		
50-249 employees	125	41.7%
250-499 employees	94	31.3%
500-749 employees	33	11.0%
More than 500 employees	48	16.0%
Time on the market:		
up to 3 years	150	50.0%
3-5 years	14	4.7%
5-7 years	8	2.7%
7-9 years	2	0.6%
More than 9 years	126	42.0%
Type of ownership:		
limited liability company	179	59.7%
joint-stock company	52	17.3%
state-owned enterprise	69	23.0%
Scope of operations:		
international	130	43.3%
national	82	27.3%
regional	38	12.7%
local	50	16.7%
Main type of activity:		
services	162	54.0%
production	119	39.7%
trade	19	6.3%

Source: own research (raw data in Appendix)

The most frequent type of ownership of young organizations was limited liability company (59.7%). The geographical coverage of the enterprises was highly-diversified, with the most numerous operating globally (43.3%). The prevailing type of business activity of the study entities was the provision of services (54%). The enterprises which prevailed in the population studied were medium-sized, i.e. employing between 50 and 249 employees (41.7%), operating on the market up to 3 years (50.0%). The analysis of research results in the group of young enterprises is presented in another papers (Bombiak, Marciniuk-Kluska 2018; Bombiak, Marciniuk-Kluska 2019).

3. SHRM as New Direction of the HR Function Evolution

Human resource management referred to as the HR function is a strategic and coherent approach to the management of the most valuable assets of organizations – their employees (Armstrong 2006). The process of human resource management includes a number of activities, i.e. the planning and selection of staff members, professional adaptation, professional development, evaluation, motivation, and staff reduction. These actions are to create suitable HR resources and fill position with responsible and well-qualified people (Lussier 2008).

For many years, the main goal of HRM was an increase in the shareholder value (Beer, Boselie, Brewster 2015) . Financial performance was treated as the underlying element of an added value generated by HRM, whereas the needs and expectations of staff members were considered of lesser importance (Van De Voorde, Paauwe, Van Veldhoven 2012; Cleveland, Byrne, Cavanagh 2015).

Nowadays, internal and external challenges compel organizations to rethink HRM strategies in a search for the best ways to create value for shareholders (Guest, 2017; Stankevičiūtė, Savanevičienė 2018). One of the new directions of an evolution of the HR function is the model of sustainable human resource management (Enher & Harry 2012; Pocztowski 2016). It is a consequence of the relationship between human resource management and sustainable development (Mariappanadar 2003; Ehnert, Harry & Zink 2014; Kramar 2014). The analysis of international databases show a growing number of studies devoted to SHRM (Figure 1). The literature review shows some difficulties in conceptualization, as well as, different terminologies to link sustainability and HRM (Macke, Genari 2019).

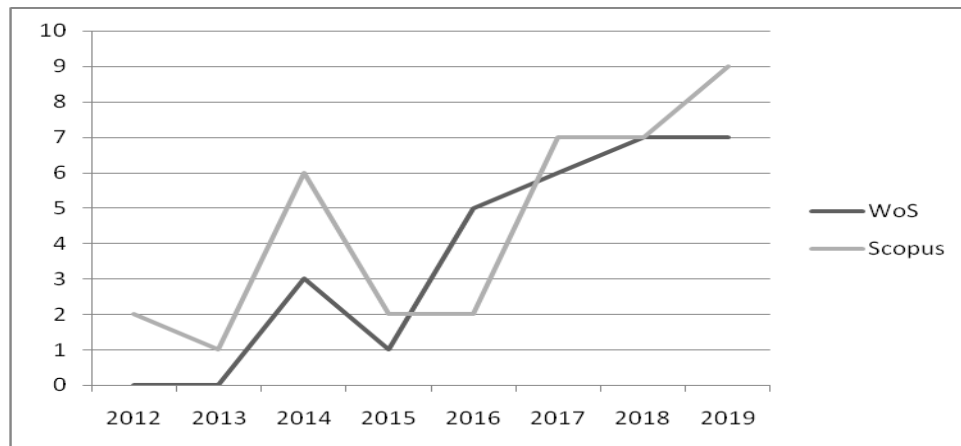


Figure 1. The number of publications containing the term “Sustainable Human Resource Management” in selected databases

SHRM represents a novel approach to human management through the admission of the ability to integrate some potentially contradictory economic, environmental and social goals (Pabian 2015). According to Ehnert, SHRM involves taking up such practices that allow organizations to attain goals in a long-term perspective, while reflecting their great concern for employees (Enhert 2009). R. Kramar has extended the definition to include the aspect of minimizing the negative effect of enterprise operations on the natural environment, employees and communities (Kramar 2014). The HR policy in this concept is used to promote sustainable use of company resources and to support ecology (Mampra, 2013). A direct consequence of the implementation of this model is sustainable human resource development, i.e. highly qualified, environment- and socially-focused employees who understand and follow the principles of sustainable development throughout their work (Pabian 2011). What is more, SHRM creates a framework which allows one to meet the present-day challenges, such as human resource deficiency or occupational health problems (Stankevičiūtė, Savanevičienė 2018a). Selected definitions of SHRM are presented in the table 2.

Table 2. Definitions of SHRM in the opinion of various authors

Authors	Definitions
Zaugg, Blum & Thom (2001, p.1)	“SHRM is defined by methodological and instrumental approaches whose objectives are long-term-oriented, socially responsible and economically efficient recruiting, training, retaining and disemployment of employees. Increasing employability, guaranteeing a harmonious work-life-balance and enhancing individual responsibility take on an important role in the concept of sustainable human resource management.”
Mariappanadar (2003, p. 910)	“Sustainable HR strategy can be defined as the management of human resources to meet the optimal needs of the company and community of the present without compromising the ability to meet the needs of the future.”
Ehnert (2009, p. 74)	„Sustainable HRM is the pattern of planned or emerging human resource strategies and practices intended to enable an organizational goal achievement while simultaneously reproducing the HR base over a long-lasting

	calendar time and controlling for self-induced side and feedback effects on the HR systems on the HR base and thus on the company it self”
Kramar (2014, p. 1084)	“SHRM could be defined as the pattern of planned or emerging HR strategies and practices intended to enable the achievement of financial, social and ecological goals while simultaneously reproducing the HR base over a long term. It seeks to minimise the negative impacts on the natural environment and on people and communities and acknowledges the critical enabling role of CEOs, middle and line managers, HRM professionals and employees in providing messages which are distinctive, consistent and reflect consensus among decision-makers.”
Ehnert, Parsa, Roper, Wagner & Muller-Camen (2016, p. 90)	“Sustainable HRM can be defined as the adoption of HRM strategies and practices that enable the achievement of financial, social and ecological goals, with an impact inside and outside of the organization and over a long-term time horizon while controlling for unintended side effects and negative feedback.”
Thevanes & Arulrajah (2017, p.3)	“SHRM is the efficient, effective, and innovative applications of human resources and its practices in order to achieve economic (profit), social and environmental goals of an organization in ethical ways and means without compromising the ability of future generations to meet their own needs”.

Source: own study based on literature review

4. Review of the SHRM Models

According to Zaugg, Blum and Thom (2001), SHRM is built on three pillars: work-life balance, personal autonomy in professional development, and employability of the workers. The underlying objectives of the conceptual model of sustainable human resource management are as follows (Mazur 2017):

- 1) increasing employee employability,
- 2) using participatory management models to enhance individual responsibility,
- 3) ensuring a harmonious work-life-balance.

One can only achieve the above mentioned goals if there is a partnership between the employee and the enterprise.

The model displayed seems to narrow down the SHRM concept a bit, and to account primarily for its social aspect. It emphasizes the balance between work and employees’ personal lives, which is viewed as a guarantee of success i.e. to keep them in an organization. It fails, however, to include the environmental aspect of SHRM.

A more holistic approach, one which tries to grasp the complexity of SHRM, has been presented by De Prins (2011). The author’s suggestion comprises all four dimensions of SHRM:

- sociological perspective,
- psychological perspective,
- strategic perspective,
- green perspective.

Yet another detailed analysis of the model, in addition to an attempt to verify it using a group of European enterprises, has been depicted by I. Rompa (2011). The sociological perspective includes company social policy, health protection and diversity management. The psychological perspective focuses on the maintenance of a balance between staff’s professional and private lives, which enhances worker loyalty and efficiency. As part of the latter perspective, we can enumerate autonomy, self-development and a dialogue with employees. The strategic perspective draws one’s attention to the need of creating a link between SHRM and strategic HRM. Finally, the green perspective is about the development of staff’s environmental awareness, green competence development support, and building a company’s image as an environment-oriented entity (Rompa 2011; Mazur 2015). Hence, we may say that De Prins’ model constitutes an extension of strategic HRM by the addition of social, ecological and psychological components.

A. Pocztowski, in turn, highlights the necessity to notice the following three dimensions of SHRM: social, ecological and economic (Pocztowski 2016). The social dimension of SHRM, termed socially responsible HRM

(SRHRM), is a combination of human resource practices and the CSR concept. It is expressed by creating such working environment where staff can attain their professional goals in line with a company strategy (Pocztowski 2016). This involves an optimum use of human resources while respecting employee rights, considering their expectations, and engaging in an active staff-company dialogue. The practical implementation of this dimension is manifested by an observance of ethical principles in relations with employees throughout all stages of the personnel process (from recruitment to de-recruitment). Socially Responsible HRM activities include but are not limited to: (Mazur 2015; Pocztowski 2016; Barrena-Martinez et al. 2017):

- transparent rules of recruitment and selection;
- objectivity of evaluation criteria and gratification;
- fair remuneration – in proportion to employee contribution to work;
- offering employees opportunities to participate in company management;
- comprehensive social benefits;
- investment in employee development;
- diversity management;
- developing harmonious interpersonal relations free of discrimination, mobbing and sexual harassment;
- implementing *work-life-balance* programmes;
- taking care of employees' physical and mental health;
- analysing the needs of staff members.

The ecological dimension of SHRM is referred to as Green Human Resource Management (GHRM). This approach accounts for the ecological context in the process of personnel decision taking (Pabian 2015). Mampra (2013) defines GHRM as use of the HR policy to promote ecology and sustainable resource use in organizations. The primary objective of GHRM is to develop ecological sensitivity in employees and to make them aware of how they can support the environment through their own behaviours. This way, Green HRM supports the creation of a green workforce, who understands, appreciates, and practices ecological initiatives (Opatha & Arulrajah 2014; Mishra, Sarkar & Kiranmai 2014; Ahmad 2015). Green practices motivate employees to become more environment-oriented and help organizations lower operational costs by energy savings, waste reduction and recycling (Jayashree, Sarode 2018).

GHRM is implemented through the following (Mathapati 2013; Renwick et al. 2013; Opatha, Arulrajah 2014; Arulrajah, Opatha, Nawaratne 2015; Ahmad 2015; Bangwal, Tiwari 2015):

- inclusion of tasks related to environmental protection in job descriptions,
- inclusion of environmental criteria in the processes of recruitment and selection,
- development of green competencies,
- inclusion of environmental criteria in performance appraisals,
- encouraging the staff members to get involved with green projects and awarding them for their implementation,
- development of a green discipline of work, i.e. establishing a set of transparent rules and regulations concerning the principles of environmentally sound conduct,
- paying attention to environment-friendly behaviours at work (e.g. reducing paper use in offices, turning off computers, television sets, and lights on leaving the office),
- generating green job positions, the so-called “green-collar workers”.

The economic dimension of SHRM is demonstrated by striving at high work efficiency of individual employees, teams and organizations as a whole (Pocztowski 2016). It leads to the generation of necessary financial means to realize the HR process, including both the social and the environmental aspects (Stankevičiūtė, Savanevičienė 2018a). The economic component of SHRM accounts for the measurement of work efficiency and relations between HRM practices and corporate effectiveness (Pocztowski 2016). It comprises the following activities:

- inclusion of ecological HRM goals in the company strategy,

- measuring HRM efficiency with the application of quality factors (such as loyalty of the staff and satisfaction levels), and quantity factors (employee efficiency, return on investment in human capital, value added from human capital),
- measuring the effectiveness of HR department operations,
- measuring the value of human capital,
- monitoring HRM costs,
- HRM-related reporting.

We ought to stress that one may speak of SHRM only when all three dimensions are involved, i.e. if all the social, ecological and economic dimensions are taken into account in the company HR policy.

An outline of the SHRM model has been presented also by Stankevičiūtė and Savanevičienė (2018a). According to the authors, the SHRM model should account for the following:

- long-term orientation in HRM,
- care of employees,
- care of environment,
- profitability,
- employee participation and social dialogue,
- employee development,
- external partnership,
- flexibility,
- compliance beyond labour regulations,
- employee cooperation,
- fairness and equality.

The core aspects of SHRM are presented in the table 3.

Table 3. Characteristics of sustainable human resource management and their core aspects

Characteristic of Sustainable HRM	The Core Aspects
long-term orientation	Identification of the availability of human resources in the future; identification of the needs of the future employees; elimination of the “hire and fire” approach
care of employees	Health and safety management; work-life balance
care of environment	Evaluating the employee performance according to environment-related criteria; fostering “eco-career”; employee rewarding according to environment-related criteria
profitability	Share programmes
employee participation and social dialogue	Different types and forms of participation
employee development	Job rotation; different training forms and methods; the transfer of experience; focus on future skills and employability
external partnership	Cooperation with education system; partnership with all external stakeholders
flexibility	Flexible working arrangements; job rotation
compliance beyond labour regulations	involves employee representatives in many decision-making processes beyond those for which worker participation is a statutory requirement; financial and non-financial support
employee cooperation	Teamwork; good relationships of managers and employees
fairness and equality	Fostering diversity; respectful relationships; fairness as regards as remuneration, career

Source: (Stankevičiūtė, Savanevičienė 2018a)

Long-term orientation in HRM allows organizations to specify the availability of human resources in the future. Labour market analyses and forecast have an important role to play here. As part of this consideration given to employees, industrial health and safety management, creating ergonomic workplaces (Moody et al. 2017), work-private life balance provision, fair remuneration and optimum workload are a must.

The care about the environment is associated with a “green” employer image building through actions such as: recruitment and selection of employees demonstrating a high level of ecological awareness and knowledge, training in ecology, or awarding the staff for environment-friendly behaviour. Profitability involves economic efficiency, which is a decisive factor when it comes to the organization’s financial power and its competitiveness. Employee participation and social dialogue comprise an implementation of various forms of staff participation in company management.

Employee development is yet another proof of viewing employees as “change agents” rather than “repositories of knowledge”. In the SHRM model, employee-related expenses are treated not as costs but rather as a form of investment which may convert into an added value in the future. External partnership involves a close cooperation with the labour market, educational institutions, non-governmental institutions, and even employees’ family members to ensure a “reproduction” of human resources.

Flexibility is both quantitative flexibility, i.e. flexible workforce (of temporary staff) and flexible working hours, and functional flexibility which is acquired by staff rotation in job positions. Compliance beyond labour regulations means that SHRM may not confine itself to compliance with the binding law. Instead, it ought to reach out beyond the obligatory practices.

The SHRM model must be based on employee cooperation, for it favours knowledge exchange and trust building, which in turn bring about more benefits than competing. Fairness and equality indicate that the same rules and laws binding for all members of organizations (Stankevičiūtė and Savanevičienė 2018a).

On the basis of the conducted review of the SHRM model, it may be concluded that there has been no uniform approach to the implementation of sustainability in the HR function area. On the one hand, we ought to stress that the models cited do not conflict – they are mutually complementary. Their complementarity causes every single model to contribute to the SHRM concept and facilitate its understanding. On the other hand, the lack of one coherent model affects the scope of idea’s practical implementation.

5. Implementation of the SHRM Model in Polish Enterprises

The objective of the study was to assess the scope of implementation of the SHRM model under Polish conditions. Figure 2 presents the socially-oriented practices implemented in the studied enterprises.

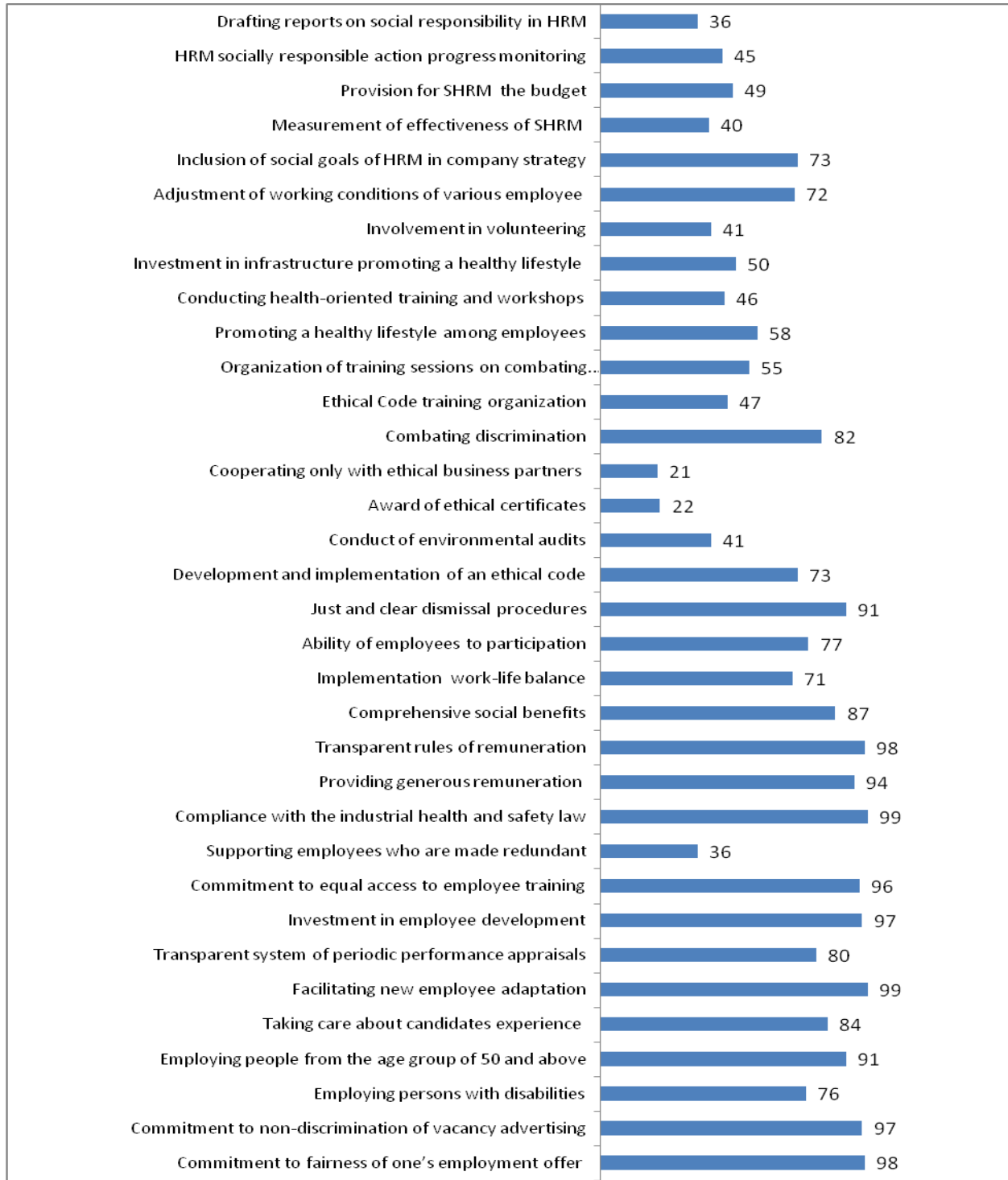


Figure 2. Implementation of socially-oriented HRM practices in Polish enterprises N=300 (data in %)

Source: own research

The analysis revealed that actions involving the social component of SHRM were executed relatively often in Polish enterprises. The most popular ones were:

- compliance with the industrial health and safety law and supporting new staff member adaptation (99%);
- commitment to fairness of one's employment offer and transparent rules of remuneration (98%);
- no discriminatory contents in recruitment ads and investment in employee development and equal access to training (97%);
- provision of generous remuneration to staff members (94%).

Among the less frequently followed activities were: employment of 50+ staff members (91%), comprehensive social benefits (87%) and taking care about candidates experience (84%). Less than a half of the studied entities (45%) monitored progress in HRM socially responsible actions and conducted ethical code trainings. Even fewer companies, only 41%, created employee volunteering opportunities and measured the effectiveness of socially responsible actions in HRM (40%). Only 1/3 of the analysed units drafted socially responsible HRM reports and supported employees who are made redundant. Similar results were obtained by analyzing socially-oriented practices in the group of young enterprises (Bombiak, Marciniuk-Kluska 2019).

The second component of SHRM is Green HRM. Figure 3 presents the environment-friendly practices performed in the HRM field in the studied enterprises. The analysis of the scope of implementation of the ecological component of SHRM showed that the most popular activity was encouraging environmental-friendly attitudes when performing professional tasks (such as office paper use reduction, waste sorting).

This practice was implemented relatively often – in as many as 78,7% of the study entities. Less than a half of the analysed enterprises (45,3%) accounted for tasks related to environmental protection in job descriptions. The following actions were pursued even less often (Bombiak, 2019):

- creation of positions responsible for environmental goals (39%)
- establishment of a clear set of rules conduct in relation to environmental protection (38%);
- inclusion of environmental goals of HRM in the company strategy (36%);
- conduct of environmental audits (31,7%).

Merely one-fourth of the studied companies identificate of employee needs with regards to ecological traininginclusion and inclusion of green HRM golas in the budget. It was equally rare to see companies measure the effectiveness of environment-friendly actions (19,7%) and to report on pro-environmental actions in HRM (19,3%). The smallest group of respondents carried out the following actions (Bombiak 2019):

- preference given to candidates with competencies and experience in ecological project performance (11%);
- exposure of environmental values in job vacancy advertising (11,7%);
- verification of candidate ecological knowledge and skills during the recruitment process (14%).

Similar results were obtained by analyzing environment-friendly practices in the group of young enterprises (Bombiak, Marciniuk-Kluska 2018).



Figure 3. Implementation of environment-friendly HRM practices in Polish enterprises N=300 (data in %)

Source: own study

6. Discussion

The new challenge contemporary enterprises need to face is to transform conventional human resource management into its sustainable counterpart. It is particularly important in view of future generations (Pabian 2015).

Against this background, it is difficult to speak of a comprehensive implementation of the SHRM model in Polish enterprises. Within the social component, we can see a relatively low popularity of actions related to the implementation of socially responsible HRM practices, such as progress monitoring, or the reporting and measuring the effectiveness of socially responsible actions in HRM. As far as the ecological component is concerned, there is a rather poorly developed range of “green” practices. Green recruitment-related activities are among those particularly rare ones. The reason behind it might be, above all, the deficit of knowledge about pro-environmental human resource practices. The analysis of the source literature indicates that the GHRM concept is relatively unknown in Poland (Bombiak and Marciniuk- Kluska 2018). Furthermore, we ought to highlight that the implementation of sustainable practices may not necessarily be evidence of SHRM model execution. At times, it is a consequence of a corporate need to improve one’s image. Such a phenomenon was confirmed by studies conducted both in Poland (Głuszek 2013) and Romania (Obrad 2018).

Other studies show similar results. Variable levels of implementation of sustainable HR practices were observed in Germany, Spain, Sweden and the United Kingdom (Diaz-Carrion 2018). In a group of practices viewed as crucial in relation to SHRM, the dominant one was the provision of balance between work and private life (Diaz-Carrion et al. 2018) and commitment to employee health and safety (Guerci and Pedriniego 2014; Stankevičiūtė and Savanevičienė 2018b). On the other hand, the analysis of websites of 50 organizations – members of the European Business Council for Sustainable Development (WBCSD) – reveal that the actions undertaken most frequently as part of SHRM are stress reduction and prevention, and work-life balance (Enhert 2009). Enhert et al.’s analysis of reports developed by 250 largest global companies according to the Forbes demonstrates that reporting involving sustainable HRM has a limited scope. The data provided most often were employment numbers (92%), employee structure by gender, age and other differentiating criteria (90%), health and safety at work (84%), and average numbers of hours devoted to employee training per annum (79%) (Enhert et al. 2016). The above suggests a reduced area of SHRM practical implementation. In the non-profit sector, such moderate implementation of sustainable HRM can also be noted. This is further evidenced by the study of Rawashdeh (2018) carried out in Jordanian hospitals. The research conducted by Diaz-Carron et al. (2018) reveals that a crucial role in SHRM practices implementation is played by the national institutional context.

Fears of the management concerning sustainable development involvement and social responsibility are yet other major barriers to the SHRM model implementation. A research study conducted amongst senior managers in 560 large companies demonstrates that these fears are associated with short-term profitability (59.7%), conflicts between economic and social goals (53.9%), and consumer price increase (41.4%) (Certo, Certo 2009). What is more, a number of executives is afraid that engagement in sustainable development will affect more commercially-oriented undertakings by stock depletion. And it is not possible to introduce sustainable HRM without the consent and knowledge of the board (Pabian 2015).

To overcome these fears, one must become aware of the benefits of the SHRM model implementation. Paillé et al. (2014) stresses that there is a direct and profound relationship between HRM practices, environmental effectiveness and organizational efficiency. Studies conducted in the year 2016 in 376 Pakistani companies demonstrate that HRM sustainable practices, especially Green HRM, may significantly increase work efficiency. In the course of the said research, a positive correlation between green recruitment and environmentally-friendly trainings and organizational efficiency was found (Bhutto, Aurazzeb 2016). Major emphasis in subject literature is placed on GHRM in the implementation of the Environmental Management System, which is a strategic tool

for gaining competitive advantage in contemporary organizations (Dubey, Gupta 2018; Kar, Praharaj 2017). GHRM implementation allows one to equip organizations with employees with high level “green” skills. It leads to *green teams*, *green leadership* and *green culture* development (Jabbour et al. 2011; Dubey, Gupta 2018) reinforces company orientation at effective use of natural resources by the reduction of wasteful use, energy saving and recycling, which brings positive effects not only in terms of environment but also in terms of economy by cost reduction (Patil, Sarode 2018), increase in efficiency (Arulrajah et al. 2015; Renwick et al. 2013) and improvement of financial results (Mishra et al. 2014). Given the foregoing, it can be said that sustainable HRM is a critical step for gaining sustainable competitive advantage by contemporary organizations. Analyses conducted by Tabatabaei et al. (2017) reveal that SHRM provides an opportunity of achieving long-term business success in a complex and dynamic business context.

All in all, the level of implementation of HR practices within the scope of the SHRM model is variable. The theoretical body of knowledge on Sustainable HRM is still in its early stages too. Sustainable HRM is a new phenomenon within management systems and thus implementation methodologies are still developing (Tabatabaei et al. 2017).

Conclusions

SHRM is a novel model of personnel function execution, the essence of which is to strike a balance between the economic rationality and social and ecological responsibility. It is aimed at supporting the society-oriented and environment-friendly corporate policy by the acquisition of suitable staff members and the development of their engagement in projects beneficial to the environment and the society. This model favours mechanisms and processes leading to the use of human resources to ensure balance at the level of organizations. Its implementation seems necessary, should organizations wish to achieve the goals of sustainable development.

More and more entrepreneurs seem to see the need to implement the SHRM model and the rationale behind it. There is still a lot to do in order to be able to talk about its practical implementation. The analysis of the level of implementation of the SHRM model in Polish enterprises demonstrated that it was a fragmented arrangement. There are clear disproportions between its social and ecological components. Even though there is a considerable interest in the execution of social practices, environment-friendly practises are not a commonly established canon. A conclusion to be drawn upon the above data is that the SHRM model is not fully implemented under Polish conditions. It is evident that there is no systemic approach to the implementation, the consequence of which is that only a selection of sustainable human resource practices is executed.

This means that the model is in early development. For the SHRM to be mature, a holistic approach must be applied. This implies that actions such as recruiting sustainable employees, broadening employee knowledge about sustainability, encouraging employees to undertake socially- and environmentally-oriented actions and rewarding them for the effects produced, become a constant element of the HR policy. They should be neither occasional nor selective.

According to the author of the research, a pivotal role in the expansion of SHRM model implementation is occupied by the management and the way in which managers view the role of the human factor in the achievement of the goals of sustainable development. A major barrier to the SHRM model, either delaying its implementation or resulting in a lack of decisions to implement it, may be a shortage of persons having the competencies to manage the HR function in line with sustainability principles. In addition, the fact that managers are often oriented at short-term outcomes also presents a risk for concept popularization in time of economic uncertainty. Needless to say, SHRM is a long-term HR strategy oriented at the application of the HR policy instruments to build sustainable organizations. In principle, the benefits that the strategy will bring – often

multidimensional and quite uneasy to quantify – can be reaped only in a more distant future. Another factor of disadvantage to SHRM model implementation is the deficit of financial means which oftentimes discourages managers from developing strategic plans encompassing not only the economic, but also the environmental and social dimension. The growth of the concept's popularity, however, does contribute to an increase in the number of studies devoted to SHRM. That is why, further analyses and research in the field are required and so is the demonstration of good practices that favour – via benchmarking – a broader SHRM model implementation in organizations.

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Appendix. List of analyzed enterprises and their profiles

Enterprise's coded name ¹	Employment number	Type of ownership	Line of business according to the Polish Classification of Activities (PKD) ²	Scope of operations	Time on the market	Net profit generated by the enterprise in the last calendar year
1	250-499	limited liability company	Non-specialized wholesale	international	More than 9 years	PLN 1000,000 - 4,999,000
2	250-499	limited liability company	Freight transport by road	international	1-3 years	More than PLN 5,000,000
3	50-249	limited liability company	Research and development activities - health care	international	1-3 years	PLN 1000,000 - 4,999,000
4	250-499	limited liability company	Manufacture of pasta and similar farinaceous foods	international	1-3 years	PLN 1000,000 - 4,999,000
5	50-249	state-owned enterprise	Management of basic types of public activity	local	1-3 years	under PLN 50,000
6	250-499	limited liability company	Processing of plastic products	international	1-3 years	More than PLN 5,000,000
7	50-249	limited liability company	Building works related to erection of residential and non-residential buildings	regional	1-3 years	PLN 500,000 - 999,000
8	750-999	limited liability company	Manufacture of plastic packaging	regional	More than 9 years	PLN 1000,000 - 4,999,000
9	250-499	limited liability company	Non-specialized wholesale	national	1-3 years	PLN 1000,000 - 4,999,000
10	250-499	limited liability company	Building works related to erection of residential and non-residential buildings	international	More than 9 years	PLN 1000,000 - 4,999,000
11	500-749	state-owned enterprise	Fire service activities	local	1-3 years	PLN 100,000 - 499,000
12	250-499	state-owned enterprise	Management of basic types of public activity	regional	1-3 years	PLN 500,000 - 999,000
13	50-249	state-owned enterprise	Management of real estate	local	3-5 years	PLN 100,000 - 499,000
14	1000-2000	limited liability company	Higher education institutions	international	More than 9 years	More than PLN 5,000,000
15	500-749	limited liability company	Manufacture of plastic packaging	international	More than 9 years	PLN 1000,000 - 4,999,000
16	50-249	limited liability company	Other personal service activities not elsewhere classified	local	1-3 years	PLN 1000,000 - 4,999,000
17	50-249	state-owned enterprise	Activities supporting education	local	Up to 1 year	PLN 50,000 - 99,000
18	50-249	limited liability company	Manufacture of other furniture	international	1-3 years	PLN 500,000 - 999,000
19	50-249	state-owned enterprise	Manufacture of other electronic and electric wires and cables	international	Up to 1 year	PLN 100,000 - 499,000
20	50-249	limited liability company	Financial leasing	international	1-3 years	PLN 500,000 - 999,000
21	50-249	limited liability company	Processing and preserving of poultry meat	regional	3-5 years	PLN 1000,000 - 4,999,000
22	50-249	limited liability company	Other software publishing	international	1-3 years	PLN 100,000 - 499,000
23	50-249	state-owned enterprise	Activities supporting education	local	1-3 years	PLN 100,000 - 499,000
24	50-249	limited liability company	Treatment and coating of metals	international	1-3 years	under PLN 50,000
25	50-249	state-owned enterprise	Activities supporting education	local	1-3 years	PLN 50,000 - 99,000
26	50-249	limited liability company	Private security activities, excluding security systems service activities	national	1-3 years	PLN 100,000 - 499,000
27	50-249	limited liability company	Computer games publishing	national	1-3 years	PLN 500,000 - 999,000
28	250-499	limited liability company	Manufacture of metal parts and plastics	national	3-5 years	PLN 1000,000 - 4,999,000
29	50-249	limited liability company	Rental and operation of own or leased real estate	regional	More than 9 years	PLN 100,000 - 499,000
30	50-249	limited liability company	Manufacture of computers and peripheral equipment	national	1. Do 1 roku	PLN 100,000 - 499,000
31	50-249	limited liability company	Other retail sale of new goods in specialized stores	national	1-3 years	PLN 50,000 - 99,000
32	50-249	limited liability company	Manufacture of other goods not elsewhere classified	national	1-3 years	PLN 1000,000 - 4,999,000
33	50-249	limited liability company	Other forms of artistic education	national	1-3 years	PLN 1000,000 - 4,999,000
34	250-499	limited liability company	Quarrying of ornamental and building stone, limestone, gypsum, chalk and slate	national	1-3 years	PLN 1000,000 - 4,999,000
35	50-249	joint-stock company	Book publishing	national	1. Do 1 roku	PLN 100,000 - 499,000
36	50-249	limited liability company	Manufacture of other goods not elsewhere classified	regional	More than 9 years	PLN 1000,000 - 4,999,000
37	50-249	limited liability company	Manufacture of electric motors, generators and transformers	international	More than 9 years	PLN 1000,000 - 4,999,000
38	50-249	state-owned enterprise	Activities supporting education	local	1-3 years	PLN 50,000 - 99,000
39	50-249	state-owned enterprise	Activities supporting education	local	1-3 years	PLN 100,000 - 499,000
40	50-249	state-owned enterprise	Activities supporting education	local	1-3 years	under PLN 50,000

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41	50-249	limited liability company	Manufacture of other goods not elsewhere classified	local	More than 9 years	PLN 500,000 - 999,000
42	50-249	limited liability company	Manufacture of metal structures and their parts	national	1-3 years	PLN 100,000 - 499,000
43	50-249	state-owned enterprise	Activities supporting education	local	3-5 years	PLN 100,000 - 499,000
44	50-249	joint-stock company	Manufacture of other goods not elsewhere classified	international	1-3 years	PLN 500,000 - 999,000
45	50-249	joint-stock company	Motion picture, video and television program production activities	international	More than 9 years	PLN 100,000 - 499,000
46	250-499	joint-stock company	Other activities auxiliary to financial services, except insurance and pension funding	national	More than 9 years	More than PLN 5,000,000
47	250-499	limited liability company	Programming of industrial robots	international	More than 9 years	More than PLN 5,000,000
48	250-499	limited liability company	Sawmilling and planning of wood	international	More than 9 years	PLN 100,000 - 499,000
49	50-249	state-owned enterprise	Activities supporting education	regional	Up to 1 year	PLN 100,000 - 499,000
50	1000-2000	limited liability company	Wholesale of grain, raw tobacco, seeds and animal feeds	national	More than 9 years	PLN 100,000 - 499,000
51	50-249	limited liability company	Motion picture, video and television program distribution activities	national	Up to 1 year	PLN 100,000 - 499,000
52	50-249	limited liability company	Motion picture projection activities	national	More than 9 years	PLN 100,000 - 499,000
53	50-249	limited liability company	Activities supporting education	local	1-3 years	PLN 500,000 - 999,000
54	50-249	limited liability company	Manufacture of other goods not elsewhere classified	national	1-3 years	PLN 100,000 - 499,000
55	50-249	limited liability company	Retail sale of flowers, plants, seeds, fertilizers, pet animals and pet food in specialized stores	international	1-3 years	PLN 100,000 - 499,000
56	50-249	limited liability company	Distribution of food products	international	More than 9 years	PLN 100,000 - 499,000
57	50-249	state-owned enterprise	Activities supporting education	local	1-3 years	PLN 100,000 - 499,000
58	50-249	state-owned enterprise	Activities supporting education	local	1-3 years	PLN 100,000 - 499,000
59	50-249	state-owned enterprise	Activities supporting education	local	Up to 1 year	PLN 500,000 - 999,000
60	50-249	state-owned enterprise	Activities supporting education	regional	1-3 years	PLN 100,000 - 499,000
61	50-249	limited liability company	Book publishing	national	1-3 years	PLN 100,000 - 499,000
62	50-249	limited liability company	Software-related activities	international	1-3 years	PLN 100,000 - 499,000
63	50-249	limited liability company	Non-specialized wholesale of foods, drinks and tobacco products	international	1-3 years	More than PLN 5,000,000
64	50-249	joint-stock company	Works related to construction of roads and motorways	international	1-3 years	PLN 500,000 - 999,000
65	50-249	limited liability company	IT equipment management activities	international	More than 9 years	PLN 100,000 - 499,000
66	50-249	limited liability company	Life insurances	national	Up to 1 year	PLN 100,000 - 499,000
67	50-249	limited liability company	Manufacture of plastic packaging	international	4, 5-7 lat	PLN 100,000 - 499,000
68	50-249	state-owned enterprise	Activities supporting education	regional	1-3 years	PLN 50,000 - 99,000
69	50-249	state-owned enterprise	Regulation of activities related to health care, education, cultural services and other social services	local	1-3 years	PLN 100,000 - 499,000
70	50-249	limited liability company	Other forms of loan provision	national	1-3 years	PLN 100,000 - 499,000
71	250-499	limited liability company	Manufacture of cosmetic products and toiletries	international	More than 9 years	PLN 500,000 - 999,000
72	50-249	limited liability company	Wired telecommunication activities	international	Up to 1 year	PLN 500,000 - 999,000
73	50-249	limited liability company	Other forms of loan provision	national	1-3 years	PLN 100,000 - 499,000
74	50-249	limited liability company	Freight transport by road	international	1-3 years	PLN 100,000 - 499,000
75	50-249	state-owned enterprise	Manufacture of plastic packaging	international	More than 9 years	PLN 500,000 - 999,000
76	50-249	limited liability company	Hairdressing and other beauty treatment	national	1-3 years	PLN 100,000 - 499,000
77	50-249	limited liability company	Agents involved in the sale of fuels, ores, metals and industrial chemicals	local	Up to 1 year	PLN 100,000 - 499,000
78	50-249	limited liability company	Repair and maintenance of finished metal products	national	1-3 years	PLN 500,000 - 999,000
79	50-249	state-owned enterprise	Activities supporting education	local	1-3 years	PLN 100,000 - 499,000
80	50-249	joint-stock company	News agency activities	national	1. Do roku	PLN 100,000 - 499,000
81	250-499	joint-stock company	Freight transport by road	international	1-3 years	PLN 50,000 - 99,000
82	50-249	state-owned enterprise	Primary schools	local	More than 9 years	PLN 100,000 - 499,000
83	50-249	limited liability company	Other publishing activities	international	1-3 years	PLN 100,000 - 499,000
84	50-249	state-owned enterprise	Justice and judicial activities	regional	1-3 years	PLN 100,000 - 499,000
85	50-249	limited liability company	Manufacture of other furniture	international	1-3 years	PLN 500,000 - 999,000
86	50-249	limited liability company	Manufacture of other goods not elsewhere classified	international	1-3 years	PLN 100,000 - 499,000
87	50-249	state-owned enterprise	Activities supporting education	local	1-3 years	PLN 50,000 - 99,000
88	50-249	state-owned enterprise	Manufacture of other electronic and electric wires and cables	local	More than 9 years	PLN 100,000 - 499,000
89	50-249	limited liability company	Wholesale of metals and metal ores	international	1-3 years	More than PLN 5,000,000
90	50-249	state-owned enterprise	Educational activities	local	Up to 1 year	under PLN 50,000
91	50-249	state-owned enterprise	Activities supporting education	local	1-3 years	PLN 50,000 - 99,000
92	50-249	limited liability company	Manufacture of jewelry and related articles	international	1-3 years	PLN 100,000 - 499,000
93	50-249	state-owned enterprise	Treatment and disposal of non-hazardous waste	regional	1-3 years	PLN 100,000 - 499,000
94	50-249	limited liability company	Other forms of loan provision	national	Up to 1 year	PLN 100,000 - 499,000
95	50-249	limited liability company	Security and commodity contracts brokerage	national	1-3 years	PLN 100,000 - 499,000
96	250-499	state-owned enterprise	Higher education institutions / Educational activities	local	1-3 years	PLN 50,000 - 99,000
97	50-249	limited liability company	Manufacture of central heating radiators and boilers	national	1-3 years	PLN 50,000 - 99,000
98	250-499	state-owned enterprise	Hospital activities	national	More than 9 years	PLN 50,000 - 99,000
99	250-499	limited liability company	Urban and suburban passenger land transport	local	1-3 years	PLN 100,000 - 499,000
100	More than 2000	state-owned enterprise	Higher education institutions / Educational activities	international	More than 9 years	PLN 100,000 - 499,000
101	500-749	joint-stock company	Manufacture of air and spacecraft and related machinery	international	More than 9 years	PLN 100,000 - 499,000
102	250-499	joint-stock company	Service activities incidental to land transportation	local	More than 9 years	PLN 100,000 - 499,000
103	1000-2000	limited liability company	Manufacture of medical and dental instruments and supplies	national	More than 9 years	PLN 50,000 - 99,000
104	50-249	state-owned enterprise	Justice and judicial activities	national	1-3 years	PLN 100,000 - 499,000
105	1000-2000	limited liability company	Manufacture of concrete products for construction purposes	national	More than 9 years	PLN 100,000 - 499,000
106	250-499	state-owned enterprise	Regulation of activities related to health care, education, cultural services and other social services, except for social security	national	More than 9 years	PLN 100,000 - 499,000
107	750-999	state-owned enterprise	Management of basic types of public activity	international	More than 9 years	PLN 50,000 - 99,000
108	250-499	limited liability company	Manufacture of paper and cardboard	international	1-3 years	More than PLN 5,000,000
109	250-499	joint-stock company	Other forms of loan provision	national	1-3 years	PLN 500,000 - 999,000
110	250-499	state-owned enterprise	Hospital activities	national	More than 9 years	PLN 50,000 - 99,000
111	500-749	joint-stock company	Production of gaseous fuels	international	More than 9 years	under PLN 50,000
112	1000-2000	joint-stock company	Manufacture of musical instruments	international	More than 9 years	More than PLN 5,000,000
113	500-749	limited liability company	Freight transport by road	national	5-7 years	PLN 100,000 - 499,000
114	50-249	limited liability company	Manufacture of other furniture	international	1-3 years	PLN 500,000 - 999,000
115	250-499	state-owned enterprise	Higher education institutions / Educational activities	international	More than 9 years	PLN 100,000 - 499,000
116	500-749	limited liability company	Other research and experimental development on natural sciences and engineering	international	More than 9 years	PLN 50,000 - 99,000
117	1000-2000	joint-stock company	Manufacture of other goods not elsewhere classified	international	More than 9 years	More than PLN 5,000,000
118	250-499	limited liability company	Manufacture of plastic packaging	international	1-3 years	PLN 100,000 - 499,000
119	50-249	joint-stock company	Manufacture of medical and dental instruments and supplies	international	More than 9 years	PLN 100,000 - 499,000
120	1000-2000	limited liability company	Manufacture of pig iron, ferro-alloys, basic iron and steel and metallurgical articles	international	More than 9 years	PLN 100,000 - 499,000
121	250-499	limited liability company	Freight transport by road	national	More than 9 years	PLN 500,000 - 999,000
122	50-249	joint-stock company	Other passenger land transport not elsewhere classified	local	1-3 years	PLN 50,000 - 99,000
123	1000-2000	joint-stock company	Installation of industrial machinery, equipment and fittings	international	1-3 years	PLN 100,000 - 499,000
124	250-499	limited liability company	Manufacture of other parts and accessories for motor vehicles excluding motorcycles	international	1-3 years	PLN 100,000 - 499,000
125	500-749	joint-stock company	Electrical installation	national	More than 9 years	PLN 500,000 - 999,000
126	500-749	joint-stock company	Precious metals production	international	More than 9 years	More than PLN 5,000,000
127	50-249	limited liability company	Growing of cereals, leguminous crops and oil plants, for seeds, except rice	national	1-3 years	PLN 100,000 - 499,000
128	250-499	state-owned enterprise	Urban and suburban passenger land transport	local	1-3 years	under PLN 50,000
129	500-749	limited liability company	Manufacture of metal elements of building woodwork	international	More than 9 years	More than PLN 5,000,000
130	50-249	state-owned enterprise	Business and other management consultancy activities	regional	1-3 years	PLN 100,000 - 499,000
131	1000-2000	joint-stock company	Manufacture of industrial gases	international	More than 9 years	PLN 100,000 - 499,000

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132	250-499	limited liability company	Wireless telecommunication activities, except satellite telecommunication	national	1-3 years	More than PLN 5,000,000
133	250-499	limited liability company	Retail sale of clothing in specialized stores	international	1-3 years	PLN 100,000 - 4,999,000
134	250-499	limited liability company	Manufacture of dyes and pigments	international	More than 9 years	PLN 100,000 - 499,000
135	50-249	limited liability company	Primary aluminum production	national	More than 9 years	PLN 100,000 - 499,000
136	250-499	limited liability company	Manufacture of other outerwear	international	More than 9 years	PLN 500,000 - 999,000
137	50-249	state-owned enterprise	Higher education institutions / Educational activities	regional	1-3 years	PLN 100,000 - 499,000
138	500-749	joint-stock company	Manufacture of cocoa, chocolate and sugar confectionery	international	More than 9 years	PLN 100,000 - 4,999,000
139	250-499	limited liability company	Manufacture of other goods not elsewhere classified	international	More than 9 years	PLN 50,000 - 99,000
140	250-499	limited liability company	Other forms of loan provision	national	More than 9 years	More than PLN 5,000,000
141	250-499	state-owned enterprise	Higher education institutions / Educational activities	regional	More than 9 years	PLN 50,000 - 99,000
142	50-249	state-owned enterprise	Management of basic types of public activity	local	1-3 years	PLN 100,000 - 499,000
143	250-499	limited liability company	Manufacture of other outerwear	international	1-3 years	More than PLN 5,000,000
144	250-499	limited liability company	Manufacture of paper and cardboard	national	1-3 years	PLN 100,000 - 4,999,000
145	250-499	limited liability company	Manufacture of other electronic and electric wires and cables	international	More than 9 years	PLN 100,000 - 4,999,000
146	1000-2000	joint-stock company	Electrical energy generation	national	More than 9 years	PLN 500,000 - 999,000
147	250-499	joint-stock company	Manufacture of games and toys	international	More than 9 years	PLN 500,000 - 999,000
148	1000-2000	limited liability company	Manufacture of consumer electronics	international	More than 9 years	More than PLN 5,000,000
149	250-499	limited liability company	Water collection, treatment and supply	local	1-3 years	PLN 100,000 - 4,999,000
150	50-249	limited liability company	Manufacture of office and shop furniture	international	More than 9 years	PLN 100,000 - 499,000
151	500-749	limited liability company	Manufacture of (tele)communication equipment	international	1-3 years	More than PLN 5,000,000
152	50-249	state-owned enterprise	Other research and experimental development on natural sciences and engineering	international	1-3 years	under PLN 50,000
153	250-499	limited liability company	Works related to construction of roads and motorways	regional	More than 9 years	PLN 100,000 - 4,999,000
154	50-249	limited liability company	Works related construction of other civil and water engineering facilities not elsewhere classified	regional	1-3 years	PLN 100,000 - 4,999,000
155	More than 2000	joint-stock company	Production and processing of petroleum refining products	international	More than 9 years	More than PLN 5,000,000
156	50-249	joint-stock company	Building works related to erection of residential and non-residential buildings	regional	1-3 years	PLN 100,000 - 4,999,000
157	500-749	joint-stock company	Satellite telecommunication activities	national	1-3 years	More than PLN 5,000,000
158	1000-2000	limited liability company	Wholesale of parts and accessories for motor vehicles excluding motorcycles	international	More than 9 years	More than PLN 5,000,000
159	50-249	limited liability company	Business and other management consultancy activities	national	1-3 years	PLN 500,000 - 999,000
160	500-749	limited liability company	Manufacture of office and shop furniture	international	3-5 years	More than PLN 5,000,000
161	250-499	limited liability company	Wholesale of china, ceramics and glassware and cleaning materials	national	More than 9 years	More than PLN 5,000,000
162	250-499	limited liability company	Other forms of loan provision	national	More than 9 years	More than PLN 5,000,000
163	750-999	joint-stock company	Wholesale clothing and footwear	international	5-7 years	More than PLN 5,000,000
164	250-499	limited liability company	Production of fruit and vegetables	international	5-7 years	PLN 500,000 - 999,000
165	250-499	state-owned enterprise	Higher education institutions / Educational activities	regional	3-5 years	PLN 50,000 - 99,000
166	250-499	state-owned enterprise	Accounting, bookkeeping and auditing activities; tax consultancy	local	1-3 years	PLN 100,000 - 499,000
167	250-499	limited liability company	Steam, hot water and air conditioning manufacture and supply	local	1-3 years	More than PLN 5,000,000
168	250-499	joint-stock company	Manufacture of veneer sheets and wood-based panels	international	3-5 years	PLN 100,000 - 4,999,000
169	More than 2000	joint-stock company	Production of meat products except for poultry meat	international	More than 9 years	More than PLN 5,000,000
170	750-999	limited liability company	Software-related activities	international	More than 9 years	More than PLN 5,000,000
171	500-749	limited liability company	Management of basic types of public activity	local	More than 9 years	More than PLN 5,000,000
172	500-749	limited liability company	Processing and preserving of poultry meat	international	More than 9 years	More than PLN 5,000,000
173	50-249	limited liability company	Hotels and similar accommodation	regional	1-3 years	PLN 100,000 - 4,999,000
174	500-749	limited liability company	Manufacture of rusks and biscuits; manufacture of preserved pastry goods and cakes	national	More than 9 years	More than PLN 5,000,000
175	250-499	state-owned enterprise	Management of basic types of public activity	national	1-3 years	PLN 500,000 - 999,000
176	250-499	limited liability company	Manufacture of plastic packaging	international	1-3 years	PLN 100,000 - 4,999,000
177	250-499	limited liability company	Manufacture of other outerwear	international	5-7 years	More than PLN 5,000,000
178	250-499	joint-stock company	Manufacture of other goods not elsewhere classified	international	1-3 years	PLN 100,000 - 4,999,000
179	500-749	limited liability company	FMCG food industry	international	More than 9 years	More than PLN 5,000,000
180	More than 2000	limited liability company	Urban and suburban passenger land transport	regional	More than 9 years	PLN 100,000 - 4,999,000
181	250-499	limited liability company	Retail sale of meat and meat products in specialized stores	regional	3-5 years	PLN 100,000 - 499,000
182	750-999	limited liability company	Manufacture of railway locomotives and rolling stock	international	More than 9 years	More than PLN 5,000,000
183	More than 2000	limited liability company	Intermediation in the sale of advertising space in electronic media (Internet)	international	More than 9 years	More than PLN 5,000,000
184	50-249	limited liability company	Restaurants and other eateries	local	1-3 years	PLN 100,000 - 4,999,000
185	750-999	limited liability company	Manufacture of rubber tires and tubes; retreading and rebuilding of rubber tires	international	More than 9 years	PLN 100,000 - 4,999,000
186	250-499	state-owned enterprise	Management of basic types of public activity	national	More than 9 years	PLN 50,000 - 99,000
187	50-249	limited liability company	Specialist medical practice	national	1-3 years	PLN 100,000 - 4,999,000
188	50-249	limited liability company	Production of meat products except for poultry meat	national	1-3 years	PLN 100,000 - 4,999,000
189	250-499	limited liability company	Other personal service activities not elsewhere classified	national	1-3 years	PLN 100,000 - 4,999,000
190	250-499	limited liability company	Management of basic types of public activity	national	More than 9 years	More than PLN 5,000,000
191	50-249	state-owned enterprise	Fire service activities	national	1-3 years	under PLN 50,000
192	50-249	limited liability company	Activities supporting education	local	1-3 years	PLN 100,000 - 499,000
193	50-249	limited liability company	Collection of non-hazardous waste	regional	1-3 years	PLN 100,000 - 4,999,000
194	250-499	state-owned enterprise	Justice and judicial activities	regional	1-3 years	PLN 100,000 - 499,000
195	250-499	limited liability company	Long-distance passenger rail transport	local	More than 9 years	More than PLN 5,000,000
196	50-249	limited liability company	Beverage preparation and serving	national	More than 9 years	PLN 100,000 - 499,000
197	250-499	limited liability company	Warehousing and storing of other goods	national	1-3 years	More than PLN 5,000,000
198	250-499	limited liability company	Other transport agency activities	national	1-3 years	PLN 500,000 - 999,000
199	250-499	limited liability company	Sale of cosmetic products	international	7-9 years	More than PLN 5,000,000
200	50-249	joint-stock company	Manufacture of plastic plates, sheets, tubes and profiles	international	2. 1-3 lat	PLN 100,000 - 4,999,000
201	1000-2000	joint-stock company	Manufacture of oils and other fluid fats	international	More than 9 years	More than PLN 5,000,000
202	50-249	limited liability company	Software-related activities	international	1-3 years	PLN 50,000 - 99,000
203	500-749	joint-stock company	Manufacture of other goods not elsewhere classified	international	1-3 years	PLN 100,000 - 4,999,000
204	1000-2000	limited liability company	Production of fruit and vegetables	national	More than 9 years	More than PLN 5,000,000
205	50-249	limited liability company	Manufacture of oils and other fluid fats	local	More than 9 years	PLN 100,000 - 499,000
206	250-499	limited liability company	Warehousing and storing of gas fuels	national	3-5 years	More than PLN 5,000,000
207	50-249	limited liability company	Production of fruit and vegetable juice	national	1-3 years	PLN 50,000 - 99,000
208	50-249	limited liability company	Works related to transmission pipelines and distribution networks	national	More than 9 years	PLN 50,000 - 99,000
209	250-499	joint-stock company	Wholesale of chemical products	national	1-3 years	PLN 500,000 - 999,000
210	250-499	state-owned enterprise	Other professional, scientific and technical activities not elsewhere classified	regional	1-3 years	PLN 50,000 - 99,000
211	1000-2000	limited liability company	Manufacture of air and spacecraft and related machinery	international	3-5 years	PLN 100,000 - 4,999,000
212	50-249	state-owned enterprise	Business and other management consultancy activities	regional	1-3 years	PLN 100,000 - 499,000
213	250-499	state-owned enterprise	Activities of employment placement and headhunting	regional	More than 9 years	PLN 100,000 - 499,000
214	500-749	joint-stock company	Other processing and preserving of fruit and vegetables	national	More than 9 years	More than PLN 5,000,000
215	50-249	limited liability company	Other passenger land transport not elsewhere classified	national	1-3 years	PLN 100,000 - 4,999,000
216	750-999	joint-stock company	Steam, hot water and air conditioning manufacture and supply	regional	More than 9 years	PLN 100,000 - 4,999,000
217	500-749	joint-stock company	Life insurances	national	More than 9 years	More than PLN 5,000,000
218	50-249	limited liability company	Steam, hot water and air conditioning manufacture and supply	local	1-3 years	PLN 500,000 - 999,000
219	500-749	limited liability company	Manufacture of other furniture	international	More than 9 years	More than PLN 5,000,000
220	250-499	joint-stock company	Manufacture of other goods not elsewhere classified	international	1-3 years	PLN 100,000 - 499,000

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221	250-499	state-owned enterprise	Water collection, treatment and supply	local	5-7 years	PLN 50,000 - 99,000
222	1000-2000	limited liability company	Manufacture of soap and detergents, cleaning and polishing preparations	international	More than 9 years	PLN 1000,000 - 4,999,000
223	250-499	state-owned enterprise	Justice and judicial activities	regional	More than 9 years	PLN 50,000 - 99,000
224	1000-2000	joint-stock company	Residential building	international	1-3 years	More than PLN 5,000,000
225	50-249	state-owned enterprise	Activities supporting education	regional	1-3 years	PLN 50,000 - 99,000
226	50-249	limited liability company	Manufacture of electronic elements	international	1-3 years	PLN 500,000 - 999,000
227	250-499	limited liability company	Manufacture of knitted and crocheted hosiery	international	More than 9 years	PLN 500,000 - 999,000
228	500-749	limited liability company	Treatment and coating of metals	international	More than 9 years	More than PLN 5,000,000
229	500-749	state-owned enterprise	Fire service activities	local	More than 9 years	PLN 50,000 - 99,000
230	500-749	limited liability company	Other forms of loan provision	regional	More than 9 years	More than PLN 5,000,000
231	50-249	limited liability company	Manufacture of other outerwear	international	1-3 years	PLN 1000,000 - 4,999,000
232	250-499	limited liability company	Higher education institutions / Educational activities	national	More than 9 years	PLN 500,000 - 999,000
233	50-249	limited liability company	Silviculture and other forestry activities, excluding gathering of forestry products	local	1-3 years	PLN 500,000 - 999,000
234	250-499	joint-stock company	Manufacture of refractory products	international	More than 9 years	More than PLN 5,000,000
235	250-499	limited liability company	Wireless telecommunication activities, except satellite telecommunication	international	More than 9 years	PLN 1000,000 - 4,999,000
236	50-249	limited liability company	Manufacture of cocoa, chocolate and sugar confectionery	international	1-3 years	PLN 50,000 - 99,000
237	1000-2000	limited liability company	Manufacture of other goods not elsewhere classified	international	3-5 years	More than PLN 5,000,000
238	50-249	limited liability company	Tool production	national	1-3 years	PLN 1000,000 - 4,999,000
239	1000-2000	limited liability company	Manufacture of knitted and crocheted hosiery	international	More than 9 years	PLN 500,000 - 999,000
240	250-499	limited liability company	Milk processing and cheese production	national	More than 9 years	PLN 500,000 - 999,000
241	250-499	limited liability company	Manufacture of tobacco products	international	More than 9 years	More than PLN 5,000,000
242	500-749	limited liability company	Manufacture of pig iron, ferro-alloys, basic iron and steel and metallurgical articles	international	More than 9 years	More than PLN 5,000,000
243	500-749	state-owned enterprise	Management of basic types of public activity	local	1-3 years	PLN 50,000 - 99,000
244	500-749	limited liability company	Higher education institutions / Educational activities	international	More than 9 years	More than PLN 5,000,000
245	More than 2000	joint-stock company	Large volume chemical production	international	More than 9 years	PLN 1000,000 - 4,999,000
246	250-499	state-owned enterprise	Works related to construction of roads and motorways	regional	1-3 years	PLN 50,000 - 99,000
247	250-499	limited liability company	Urban and suburban passenger land transport	local	More than 9 years	PLN 1000,000 - 4,999,000
248	50-249	limited liability company	Hotels and similar accommodation	regional	More than 9 years	under PLN 50,000
249	250-499	state-owned enterprise	Service activities related to office administration	international	More than 9 years	PLN 500,000 - 999,000
250	500-749	limited liability company	Renovation activities	international	More than 9 years	More than PLN 5,000,000
251	50-249	limited liability company	Restaurants and other eateries	regional	More than 9 years	PLN 1000,000 - 4,999,000
252	1000-2000	joint-stock company	Security services	national	More than 9 years	PLN 500,000 - 999,000
253	500-749	limited liability company	Works related construction of other civil and water engineering facilities not elsewhere classified	national	1-3 years	More than PLN 5,000,000
254	250-499	joint-stock company	Steam, hot water and air conditioning manufacture and supply	local	1-3 years	More than PLN 5,000,000
255	500-749	limited liability company	Manufacture of other builders' carpentry and joinery	international	More than 9 years	More than PLN 5,000,000
256	1000-2000	limited liability company	Casting of steel	international	More than 9 years	PLN 1000,000 - 4,999,000
257	50-249	limited liability company	Manufacture of other goods not elsewhere classified	international	1-3 years	PLN 1000,000 - 4,999,000
258	50-249	limited liability company	Retail sale in non-specialized stores with food, beverages or tobacco predominating	local	1-3 years	PLN 100,000 - 499,000
259	50-249	limited liability company	Private security activities, excluding security systems service activities	local	1-3 years	PLN 50,000 - 99,000
260	250-499	limited liability company	Hospital activities	local	More than 9 years	under PLN 50,000
261	250-499	limited liability company	Higher education institutions / Educational activities	national	More than 9 years	PLN 1000,000 - 4,999,000
262	50-249	joint-stock company	Manufacture of hollow glass	international	1-3 years	PLN 500,000 - 999,000
263	50-249	joint-stock company	Engineering activities and related technical advisory services	national	More than 9 years	PLN 50,000 - 99,000
264	250-499	limited liability company	Furniture production	international	1-3 years	PLN 1000,000 - 4,999,000
265	250-499	joint-stock company	Urban and suburban passenger land transport	regional	Up to 1 year	More than PLN 5,000,000
266	500-749	state-owned enterprise	Management of basic types of public activity	regional	3-5 years	PLN 50,000 - 99,000
267	750-999	limited liability company	Manufacture of knitted and crocheted hosiery	international	More than 9 years	More than PLN 5,000,000
268	250-499	limited liability company	Manufacture of pig iron, ferro-alloys, basic iron and steel and metallurgical articles	international	1-3 years	PLN 1000,000 - 4,999,000
269	More than 2000	limited liability company	Manufacture of other goods not elsewhere classified	international	More than 9 years	under PLN 50,000
270	More than 2000	limited liability company	Manufacture of finished textile products	international	More than 9 years	More than PLN 5,000,000
271	250-499	joint-stock company	Engineering activities and related technical advisory services	international	1-3 years	PLN 500,000 - 999,000
272	1000-2000	limited liability company	Production of other primary inorganic chemicals	international	More than 9 years	PLN 1000,000 - 4,999,000
273	50-249	limited liability company	General medical practice	local	1-3 years	PLN 500,000 - 999,000
274	750-999	limited liability company	Manufacture of games and toys	international	More than 9 years	under PLN 50,000
275	250-499	limited liability company	Manufacture of metal structures and their parts	international	More than 9 years	PLN 1000,000 - 4,999,000
276	250-499	limited liability company	Civil engineering	international	More than 9 years	More than PLN 5,000,000
277	250-499	state-owned enterprise	Other research and experimental development on natural sciences and engineering	international	1-3 years	PLN 50,000 - 99,000
278	More than 2000	limited liability company	Activities of employment placement and headhunting	international	7-9 years	PLN 1000,000 - 4,999,000
279	250-499	limited liability company	Manufacture of other electronic equipment	international	1-3 years	PLN 1000,000 - 4,999,000
280	250-499	limited liability company	Manufacture of explosives	national	1-3 years	More than PLN 5,000,000
281	50-249	state-owned enterprise	Manufacture of rubber tires and tubes; retreading and rebuilding of rubber tires	regional	1-3 years	under PLN 50,000
282	50-249	limited liability company	Steam, hot water and air conditioning manufacture and supply	local	1-3 years	PLN 1000,000 - 4,999,000
283	1000-2000	limited liability company	Other forms of loan provision	national	More than 9 years	More than PLN 5,000,000
284	250-499	joint-stock company	Freight transport by road	national	1-3 years	More than PLN 5,000,000
285	More than 2000	joint-stock company	Manufacture of rubber tires and tubes; retreading and rebuilding of rubber tires	international	5-7 years	More than PLN 5,000,000
286	500-749	limited liability company	Ice-cream production	international	3-5 years	PLN 1000,000 - 4,999,000
287	500-749	joint-stock company	Non-specialized wholesale	national	More than 9 years	More than PLN 5,000,000
288	250-499	limited liability company	Management of real estate on a fee or a contract basis	national	1-3 years	PLN 1000,000 - 4,999,000
289	250-499	limited liability company	Other retail sale of clothing in non-specialized stores	regional	More than 9 years	More than PLN 5,000,000
290	More than 2000	joint-stock company	Mining of other non-ferrous metal ores	international	1-3 years	More than PLN 5,000,000
291	250-499	limited liability company	Management of real estate	regional	More than 9 years	PLN 500,000 - 999,000
292	1000-2000	state-owned enterprise	Justice and judicial activities	national	More than 9 years	PLN 50,000 - 99,000
293	1000-2000	joint-stock company	Mining of lignite	national	More than 9 years	More than PLN 5,000,000
294	250-499	limited liability company	Retail sale of metal products, paint and glass in specialized stores	national	More than 9 years	More than PLN 5,000,000
295	500-749	limited liability company	Manufacture of other special-purpose machinery not elsewhere classified	international	1-3 years	More than PLN 5,000,000
296	1000-2000	limited liability company	Manufacture of ceramic sanitary fixtures	international	More than 9 years	More than PLN 5,000,000
297	1000-2000	joint-stock company	Other monetary intermediation	national	More than 9 years	More than PLN 5,000,000
298	1000-2000	limited liability company	Manufacture of other construction materials	international	More than 9 years	More than PLN 5,000,000
299	50-249	limited liability company	Steam, hot water and air conditioning manufacture and supply	national	5-7 years	PLN 50,000 - 99,000
300	250-499	limited liability company	Manufacture of other metal goods not elsewhere classified	international	More than 9 years	PLN 1000,000 - 4,999,000

¹ To ensure anonymity of the research, the names of the participating enterprises have been coded

² PKD – *Polska Klasyfikacja Działalności* (Polish Classification of Activities)- is the Polish division/classification of the types of socio-economic activities pursued by business entities

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Edyta BOMBIAK (PhD) is the Doctor of Sciences (Economics) at Siedlce University of Natural Sciences and Humanities, Director of the Institute of Management and Quality Studies. Research interests: human resource management, human resources risk management, intellectual capital in the organization, sustainability.

ORCID ID: orcid.org/0000-0002-0273-6228



Register for an ORCID ID

<https://orcid.org/register>

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HOW TO MAKE FURNITURE INDUSTRY MORE CIRCULAR? THE ROLE OF COMPONENT STANDARDISATION IN READY-TO-ASSEMBLE FURNITURE

Malgorzata Koszewska ¹, Maciej Bielecki ²

^{1,2} Lodz University of Technology, Faculty of Management and Production Engineering, Department of Production Management and Logistics, Wolczanska 215, 90-924 Lodz, Poland

E-mails: ¹ malgorzata.koszewska@p.lodz.pl ; ² maciej.bielecki@p.lodz.pl

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Abstract. The transition towards a circular economy has become one of the biggest challenges faced by enterprises in the second decade of the 21st century. It is also perceived as one of the key levers for achieving sustainable development goals. However, the peculiar features of individual industries require individual approaches and careful analyses. The paper focuses on the furniture industry, which in Europe faces a variety of economic, environmental and regulatory challenges. To meet those challenges and truly close the loop a more strategic approach from the industry is needed. There is also a huge demand for practical options that would be immediately accessible for business organisations that need not necessarily be based on breakthrough technological solutions as these may still be economically not viable. The article aims to fill this gap and to meet these challenges. Different models implying varied engagement of consumers, furniture manufacturers/retailers, and external contractors in closing the loop and making the industry more sustainable are proposed and recommendations for the most promising ones are made. The most preferable model requires not only that business organisations take a strategic approach involving a high level of component standardisation but also active consumer engagement in used/unwanted furniture sourcing and disassembly. The primary research allowed us to assess the level of standardisation defined as the level of repeatability of assembly parts used in ready-to-assemble furniture. The analysis was made for the selected product group (sofas) of a global leading furniture producer and retailer (IKEA). It was found that within the specific product series, standardisation is evident, whereas it varies significantly across series of different products leaving some room for improvement.

Keywords: circular economy; sustainability; circular product design; consumer; furniture; closed-loop supply chain

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JEL Classifications: L21, L68, M11, M21, O33, Q56

1. Introduction

Over the past few years, sustainable development has increasingly become a strategic goal for businesses and governments. Sustainable consumption and production patterns are strongly recommended in initiatives such as

the United Nations Sustainable Development Goals or the European Union Sustainable Development Strategy, which are priority challenges (Muñoz-Torres et al., 2018). At the same time, it is becoming increasingly obvious that the present linear (take-make-dispose) model of economy has slim chances of effectively adopting sustainable development principles. It is becoming more and more evident that this “linear” formula is coming to an end as natural resources are being exhausted, prices are fluctuating, economy is becoming dependent on suppliers from other countries, and threats to ecological and social balance are rising. Consequently, the circular economy (CE) model, perceived as a tangible set of solutions and a great opportunity to reach sustainable patterns of production and consumption, is gaining progressively more attention (Foltynowicz, 2016; Lewandowski, 2016; Vasiljevic-Shikaleska, Gjozinska, & Stojanovikj, 2017; Vegeera et al., 2018) while the need to abandon the linear model in favor of the circular one is becoming increasingly urgent (Koszevska, 2019).

Therefore, the transition towards a circular economy has become one of the biggest challenges posed to enterprises in the second decade of the 21st century. European business needs to comply with new European legislation which sets very clear targets for the Member States and their industries to meet in the near future. Thus, the question for businesses today is not whether to implement the principles of a circular economy but rather when they will become the applicable standard.

Challenges of the transformation leading to a circular economy are related to every area of contemporary economies but each branch of industry will have its specific problems and methods of solving them. Peculiar features of individual industries will, therefore, require individual approaches and careful analyses. The paper will focus on the furniture industry, which in Europe faces a variety of economic, environmental and regulatory challenges.

Nowadays, 10 million tonnes of furniture are discarded by businesses and consumers in the EU each year, a majority of which is destined for either landfill or incineration. Although recycling rates in the EU have improved through the introduction of policy mechanisms such as the Landfill Directive and its diversion objectives, there is minimal activity in higher-value circular resource flows, with remanufacturing accounting for less than 2% of the EU manufacturing turnover (Forrest, Hilton, Ballinger, & Whittaker, 2017).

Increased activity can also be observed as regards looking for circular economy opportunities in the furniture sector both in academia (Forrest et al., 2017; Gullstrand Edbring, Lehner, & Mont, 2016) and in business (Forrest et al., 2017) but, at the same time, there is a need for a more strategic approach to introducing the circular model which would truly facilitate closing the loop in the industry. Business needs practical options that are not only easy to understand and introduce but also economically and technologically viable. Therefore, solutions dedicated to very specific product groups are especially valuable from that point of view. The article aims to fill this gap and meet these challenges.

On the basis of the conclusions from the available analyses and notable industry activities, the authors assume that the key determinants of the effective implementation of the circular economy model are legal regulations, availability of technology, sustainable supply chain management, product circularity potential (resulting from its design), and consumer attitudes towards circular economy resulting in actual behaviors. The paper will focus mainly on the last two board categories under which only selected specific aspects will be analysed in detail (marked in green in Fig.1 and Fig. 2).

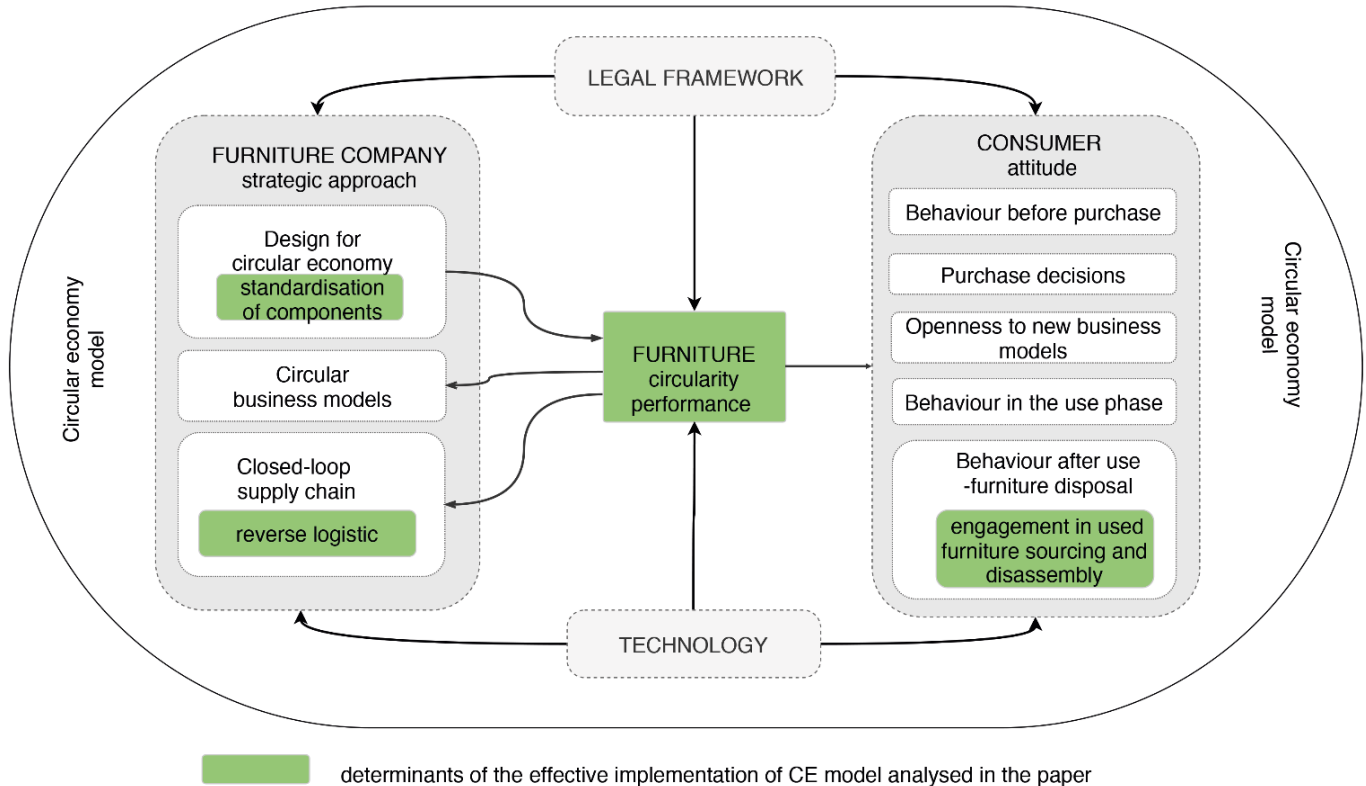


Fig.1. Determinants of effective implementation of the circular economy model in the furniture industry

The choice of the specific research areas was determined by the limited availability of study reports in the literature as well as its utilitarian value– implementation potential for business organisations.

As regards product design, we will concentrate on the aspect of standardisation of metal and plastic assembly components that enables their flow back in the supply chain – effective reuse in newly manufactured furniture. Standardisation will be analysed only concerning the repeatability of assembly parts used in the products.

Based on those premises, we have set our **research aims** as follows:

1. To present the closed-loop supply chain model for the furniture industry;
2. To propose different models (scenarios) implying varied engagement of consumers, furniture manufacturers/retailers, and external contractors in closing the loop, and to make recommendations for the most promising ones in the context of circular economy;
3. To assess the current level of standardisation of assembly components used in ready-to-assemble furniture for the selected product group (sofas) of the global leading furniture manufacturer and retailer and accordingly, determine the scope of potential improvement in this area.

We postulate that a high level of standardisation of assembly components coupled with a long-term organisational strategy and consumer engagement would lead to great progress in closing the loop in the furniture industry. At the same time, we put forward the hypothesis that the current standardisation level of assembly components in the case of global leading furniture manufacturers and retailers is relatively low and leaves a lot of space for improvement.

The **structure of the article** has been aligned with its objectives and is organised in the following way: First, based on the literature review, a closed-loop supply chain model for the furniture industry is proposed and research gaps are pointed out. They become the point of departure for narrowing the range of analysed articles down to the flow back of assembly components to the exclusion of the flow related to the reuse of an entire product - an item of furniture. Next, models (scenarios) implying varied engagement of consumers, furniture manufacturers/retailers, and external contractors in closing the loop are presented and at once, the most promising ones in the context of circular economy are singled out.

Because the effectiveness of the recommended model relies on high standardisation of assembly components, the final part of the article concentrates on the current situation with this regard. To facilitate the description, a method of analysis is advanced and indicators designed to assess the level of standardisation of assembly components used in ready-to-assemble furniture for the selected product group (sofas) of a global leading furniture manufacturer and retailer (IKEA), and thus, to determine whether any improvements are possible in this area.

2. Literature review

2.1. Closing the loop in the furniture supply chain – research gaps

In the current literature, there is a very limited number of studies concerning the circular performance of furniture. At the same time, most of the available ones concentrate mainly on the product flow in the circular economy model and analyse aspects such as systems of collection, repair, remanufacturing, reuse and reselling of second-hand/used furniture (Curran & Williams, 2010; Krystofik, Luccitti, Parnell, & Thurston, 2018), access-based (e.g. renting and leasing) or collaborative furniture consumption (e.g. sharing platforms) (Gullstrand Edbring et al., 2016), and recycling (Nyemba, Hondo, Mbohwa, & Madiye, 2018; Top, 2015).

Also, considering furniture makers' operations in the context of circular economy, it can be observed that they mainly refer to eco-efficient technologies, adoption of cleaner production practices, monitoring environmental impact, handing byproducts over to other companies (Oliveira, França, & Rangel, 2018), modular product design to extend the function of individual products (IKEA modular furniture range to enable customers to upgrade or convert furniture items into alternative uses – including conversion of sofas to beds, replacement of armrests, addition of side tables), leasing, rental and share schemes, and take-back business models - Gispén for office furniture, IKEA (Forrest et al., 2017), incentives for consumers to return furniture for reuse and recycling (tax breaks for repair - Swedish Government, voucher scheme for unwanted furniture, IKEA France) (Forrest et al., 2017).

There is a visible scarcity of analysis as well as business activity in the area of the flowback of assembly components (parts) that could be used in newly manufactured furniture. The place of this area in the furniture industry supply chain model as a whole is presented in Figure 2 - marked in green.

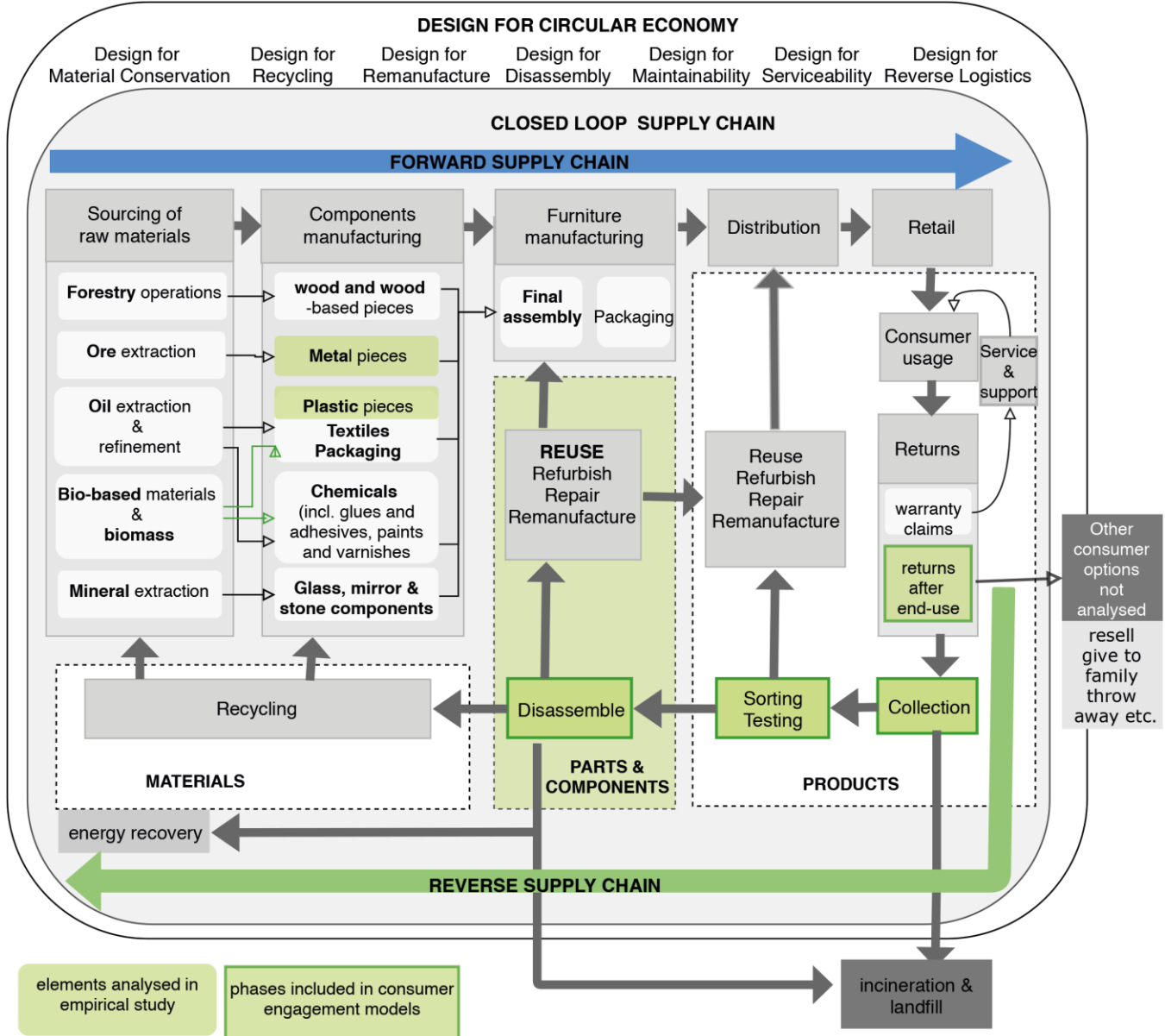


Fig.2. Design for circular economy as a determinant of closing the loop in the furniture supply chain

Source: compiled by the authors based on (Cordella and Hidalgo, 2016, (Bloemhof, Van der Laan, Van Wassenhove, & Zuidwijk, 2010; Fleischmann et al., 1997)

It is also worth emphasizing that **assembly components (parts)** in the case of furniture are mainly made of metal and plastic. Therefore, their environmental impact appears to be generally higher than for wood/wood-based materials or packaging (Cordella & Hidalgo, 2016). Their reuse in new products could bring great opportunities to reduce the need for virgin raw materials thus optimizing the use of resources and decreasing the environmental impact of furniture production. One of the crucial determinants of taking up these opportunities by the furniture industry is a high level of standardisation of components used as it makes it possible to, among others:

- increase the volume and scale of recovered components,
- increase the volume and scale of recycled materials,

- increase the effectiveness of the process of material and part recovery from used products by increasing specialization,
- streamline logistics processes for recovered materials and components and their supply to manufacturers of materials and finished products.

2.2. Measuring standardisation in the framework of general product circularity performance

On a very general level, product circularity performance could be defined as a set of characteristics that determine how effective a product can be in circular economy. It is determined mainly in the design phase and strongly influences the success of introducing closed-loop supply chain and circular business models (see Fig. 1).

At the moment, an animated discussion can be observed concerning the definition and assessment of product circularity performance. Current tools (such as the Material Circularity Indicator (Ellen MacArthur Foundation, 2015), the Circular Economy Toolkit (Evans & Bocken, 2019), and the Circular Economy Performance Indicator (Griffiths & Cayzer, 2016)) provide a rudimentary and rapid overview of a product circularity but they do not provide operational guidance for engineers, designers, and managers on improving their products in the context of circular economy. The need for providing methods and tools to evaluate product performance in the light of circular economy on the operational level is strongly emphasized (Saidani, Yannou, Leroy, & Cluzel, 2017). A recent paper by Mesa et al. (Mesa, Esparragoza, & Maury, 2018) presents a broad overview of conventional indicators employed to assess the sustainability of products as well as indicators for measuring the Circular Economy performance in products. Their analyses showed that the current indicators are designed to analyse single products instead of product families capable of sharing components among their product variants. Therefore, they proposed a set of indicators addressed to measure sustainability performance in product families considering the circularity of components among the product variants as well as functional requirements. Those indicators can provide a useful framework for furniture designers in the field of design for sustainability but they are not intended for measuring the actual standardisation level of furniture assembly components. Indicators of the standardisation level have been proposed in the literature, e.g. the generational variety index (GVI) and the coupling index (CI) put forward by Mark Martin and Kosuke Ishii (Martin & Ishii, 2002). However, they require a thorough understanding of product design specifications. This type of data are not always easily obtainable from organisations, which is why one of the aims of the study is to develop methods that will make it possible to assess the actual level of standardisation of assembly components based on easily available data (e.g. available from product assembly instructions). Therefore, the following tools are proposed: a graphic matrix illustrating the degree in which the same assembly components are used in different products and a quantitative indicator of standardisation saturation.

Standardisation is however only one of the elements required for the system to work in practice. Manufacturers' long-term strategy for planning product circularity performance as well as active consumer engagement are also essential. Therefore, those three aspects will be further analysed in the foregoing paper.

3. Manufacturer attitude models - a strategy for planning product circularity performance

Table 1 presents four models of furniture manufacturer approach to the strategy for planning product circularity performance that assume different engagement levels in circular product design.

Table 1. Models of manufacturer engagement in product design and development in the context of circularity performance

Model	Manufacturer attitude			
	Active engaged	Engaged	Convenient	Passive
Vision/strategy for planning product circularity performance*	long-term strategic level	medium-term	short-term	none
REDUCE – less raw materials in newly manufactured products	✓	✓	✓	✗
REUSE of parts and components in new products	✓	✓**	✗	✗
REUSE of products retrieved from the market	✓	✓**	✗	✗
RECYCLE - use of recycled materials in new products	✓	✓	✓	✗
Performance of 3R processes	manufacturer	manufacturer & external contractor	manufacturer	-
Control over 3R processes	very high	average	average	-
Potential for circular economy	very high	high	average	low

* starting from product design using Design for X methods ** external contractor

The authors hold that the active-engaged model is the most advantageous for the implementation of a circular economy. It implies a system of product circularity planning based on the quantitative reduction of newly manufactured raw materials, materials, and intermediate products in finished products. The enterprise plans 3R processes already in the phase of product design (applying Design for X methods) and develops a strategic system of reuse of recovered raw materials, materials, and components in new furniture. The model requires the organisation to have a sustainable strategy for reusing furniture, or its components, sourced from customers as well as for genuine engagement of designers in the design processes to promote a reduction in the use of materials.

The speed and scale of the transition to the circular economy model will depend on the knowledge, awareness, and engagement of all market participants and will involve the entire product lifecycle, from design to utilization. However, a special role in this transformation will be played by consumers. The rate and success of the changes will depend on their choices, on the quantity and type of the products they buy, on their openness to new business models, and on the manner of dealing with used products (Koszewska, 2019). In the article, we concentrate on the last issue, namely, consumer behavior after product use. Even the most effective system introduced by the manufacturer will not succeed without consumer engagement.

It is also worth stressing that our understanding of consumer attitudes and behaviors in the context of circular economy is still very limited, particularly in the case of furniture. So far, studies have concentrated on disposal and acquisition methods for selected second-hand products, including furniture (Fortuna & Diyamandoglu, 2017), and on consumer attitudes relating to the three consumption models: models for extending the life of the product (e.g. by reselling second-hand goods), access-based consumption (e.g. renting and leasing), and collaborative consumption (e.g. sharing platforms) (Gullstrand Edbring et al., 2016). None have referred to consumer engagement in the system of used furniture sourcing and disassembly offered by the manufacturer. The models presented in Figure 3 aim to fill this gap.

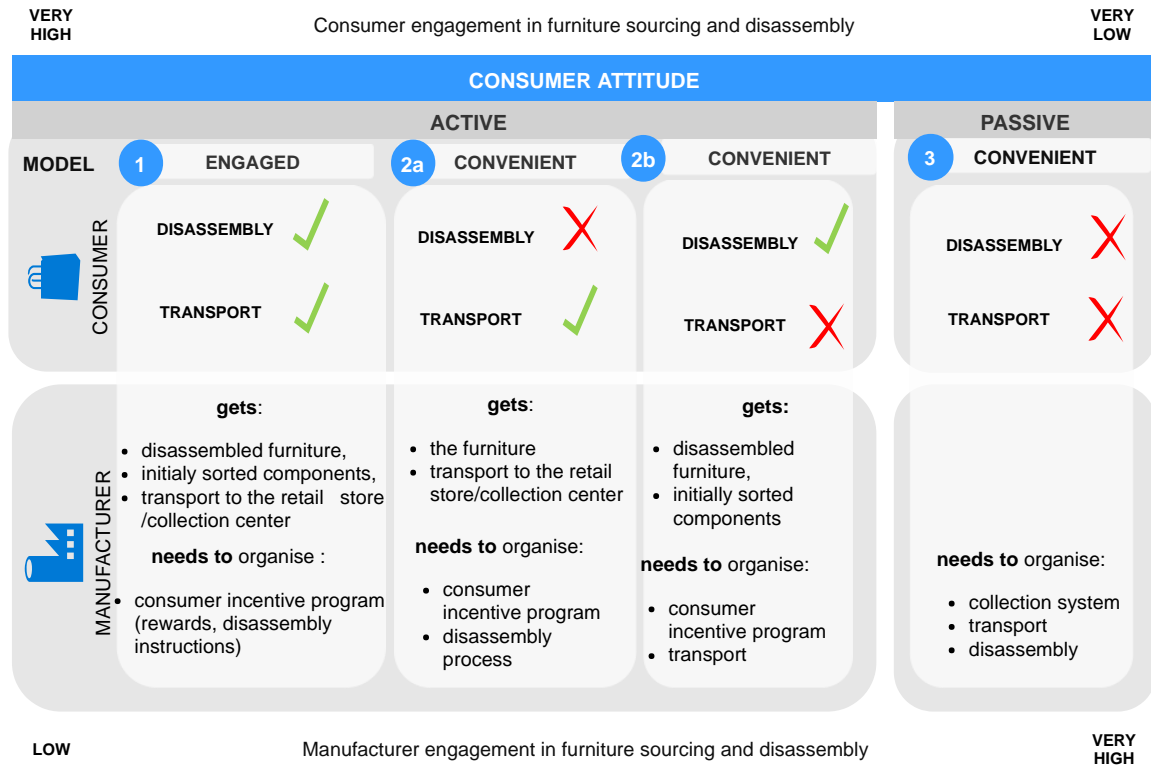


Fig. 3. Models of consumer and manufacturer engagement in furniture sourcing and disassembly

Source: authors' analysis based on (Cordella and Hidalgo, 2016, (Bloemhof et al., 2010; Fleischmann et al., 1997)

The proposed models assume different levels of consumer and manufacturer engagement in used/unwanted furniture sourcing and disassembly.

Table 2. Assessment of the proposed models' potential

	Cost for the manufacturer	Potential for retrieving furniture from the market	Potential for circular economy model
Model 1. Active -engaged	relatively low*	very high	very high****
Model 2. Active- convenient	average	average	average
Model 3. Passive-convenient	very high**	very low***	low

* costs related to consumer incentives programs – communication, reward/discount system, disassembly manuals etc.

**costs related to effective collection systems, cost of organizing transport to individual consumers, cost of furniture disassembly processes

***costs of and difficulty in reaching individual consumers; competition from other furniture disposal options available to consumers such as furniture banks, individual junk removal companies, etc.

**** conditioned by high standardisation of components and introduction by the manufacturer of a strategic system from the very beginning of the furniture design process

As shown in Table 2, the most preferable model both in the context of cost and convenience for the manufacturer/retailer and the potential for retrieving furniture from the market is model 1 which relies on an

active and engaged attitude on the part of the consumer. In this model, the consumer is willing to make the effort and disassemble the furniture as well as transport the disassembled furniture to the manufacturer.

4. Research method

The study aimed to assess the level of assembly components standardisation in global organisations which mass-produce ready-to-assemble furniture. The research was planned as follows:

In the first step, the following criteria were set for the selection of products for analysis


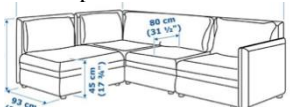

- availability to customers - recognizable and global brand,
- open access to details about products and their assembly components, a range of ready-to-assemble furniture, proved activity in the area of implementing the circular economy model.

Next, by the criteria, products of the leading global furniture manufacturer and retailer IKEA were chosen for analysis.

The initial stage of the analysis involved a preliminary assessment of the rate of part repeatability for product families with the aid of matrices which graphically presented frequency distributions for specific assembly components of individual models. This form of analysis has been termed by the authors a graphic presentation of the level of standardisation saturation. This stage of the study proceeded in the following manner:

- a range of furniture was selected (for the reported research results, it was a range of sofas with fabric covers, without bed function). Four collections (series) were analysed during that stage (Kivik, Vallengtuna, Ektorp, Vimle). The selection was based on the time that the given products had been available. Two products that had been marketed by Ikea for a considerable period (the minimum threshold was 5 years) (Ektorp, Kvik) and two relatively new models, i.e. Vimle and the modular system Vallengtuna offered since 2017 were selected. Different product variants available on the www.ikea.com/pl website in the first quarter of 2018 were included in the analysis of the product series. They are shown in Table 3.

Table 3. Product variants in the product series selected for analysis

Collection (series)	Product number	Product variant
KIVIK 10 product variants 	491.937.33	2-seat sofa
	491.937.28	3-seat sofa with chaise longue
	191.937.44	4-seat sofa with chaise longue
	391.936.82	4-seat, corner sofa
	291.936.87	5-seat, corner sofa
	291.936.92	6-seat, corner sofa
	091.937.54	3-seat, corner sofa
	691.937.08	5-seat, corner sofa with chaise longue
	591.937.18	8 seat, U-shaped sofa
	791.937.03	Corner section
	291.837.54	2-seat sofa
VALLENTUNA modular 6 product variants 	891.625.84	3-seat sofa
	491.615.10	5-seat sofa
	391.497.50	6-seat sofa
	791.497.34	3-seat, corner sofa
	791.572.05	6-seat, corner sofa
	191.291.78	2-seat sofa
EKTORP - 4 product variants 	791.292.03	3-seat sofa
	491.291.53	3-seat, corner sofa
	091.648.98	4-seat, corner sofa
	292.052.99	2-seat sofa
VIMLE - 6 product variants		

Source: authors' analysis based on the information available on www.ikea.com/pl in the first quarter of 2018

-
- Technical drawings of three components:
- A bent rod (108490) with a 90-degree bend.
 - A threaded rod (100272) with a hexagonal head.
 - A bracket assembly (147788) consisting of a plate with two holes and a square base.

Source: authors' analysis based on furniture assembly instructions from the manufacturer's website: www.ikea.com

- Table 4.** A sample matrix illustrating the level of standardisation saturation

x	assembly part present in the product (darkened matrix cell)
---	---

1697

$$Ins = \frac{\sum x}{Pn * Am} \%$$

where: x – assembly part present in a product

Pn – number of analysed products

Am – number of part types (number of different, nonrecurring, assembly parts)

It is explained in the following way: the higher the value the indicator takes – the closer to 100%, the higher the repeatability of the assembly part within the examined group of products, which indicates a higher level of standardisation. The value of 100% means that (the same) all assembly parts are used in all analysed products.

The ratio presented above provides information about the potential for standardisation resulting from the fact of using the same assembly parts in different products.

In view of assessing the actual level of standardisation it is also meaningful to know how many other products feature a specific assembly part. Therefore, further analysis was performed to establish to what extent an assembly part was used in different items of furniture by showing what percentage of assembly parts was used in one product only, and what percentage reoccurred twice, three times or n-times. A high value of one-off occurrences would indicate a low level of standardisation.

The indicators discussed above were applied in the analysis of two areas:

- assessment of the level of standardisation within one product series. Here, all product variants in a specific product series were analysed (the following four series were analysed: Kivik, Vallentuna, Ektorp, Vimle).
- assessment of the level of standardisation across different product series. Here, a specific product type featured in many different product series was examined. Based on purposive sampling, 12 fabric-upholstered two-seat sofas, each from a different product series, were selected.

In the next section, the rates of part repeatability and percentage frequency distributions for specific parts for individual product variants are graphically presented in charts and matrices, and a summary is provided.

5. Results and discussion

The matrix of standardisation saturation, which is a graphic illustration of assembly part distribution by product series for the 4 series (Kivik, Vallentuna, Ektorp Vimle), is presented in Figure 5.

The matrix shows how each one particular assembly part in specific sofas is used - it does not show how many times the part is used but merely the fact that it is. Additionally, parts featured in specific product series are marked in different colours.

1699

Product series	Product type symbol	6-digit assembly part numbers								number of unique parts used in the product (max 8)
		147786	147789	117145	108490	100272	147788	148327	147787	
		1	2	3	4	5	6	7	8	
VALLENTUNA	1	891.625.84	+	+	+	+	+	+	+	8
	2	791.497.34	+	+	+	+	+	+	+	8
	3	791.572.05	+	+	+	+	+	+	+	8
	4	291.837.54	+	+	+	+	+	+	+	8
	5	491.615.10	+	+	+	+	+	+	+	8
	6	391.497.50	+	+	+	+	+	+	+	8
number of products in which the part was used		6	6	6	6	6	6	6	6	48

Fig. 7. The matrix of standardisation saturation for the VALLENTUNA series

Source: authors' analysis based on furniture assembly instructions from the manufacturer's website: www.ikea.com/pl in the first quarter of 2018

The indicator value for the VALLENTUNA series:

$$Ins = \frac{\sum x}{Pn * Am} \% = \frac{48}{6 * 8} \% = 100\%$$

Product series	Product type symbol	6-digit assembly part numbers										number of unique parts used in the product (max 8)
		100712	120202	110439	100837	114509	121303	108116	100728	102428	121647	
		1	2	3	4	5	6	7	8	9	10	
EKTORP	1	191.291.78	+	+	+	+	+	+	+	+	+	6
	2	791.292.03	+	+	+	+	+	+	+	+	+	6
	3	091.648.98	+	+	+	+	+	+	+	+	+	7
	4	491.291.53	+	+	+	+	+	+	+	+	+	9
number of products in which the part was used (max 4)		4	4	4	4	4	4	1	1	1	1	28

Fig. 8. The matrix of standardisation saturation for the EKTORP series

Source: authors' analysis based on furniture assembly instructions from the manufacturer's website: www.ikea.com/pl in the first quarter of 2018

The indicator value for the EKTORP series:

$$Ins = \frac{\sum x}{Pn * Am} \% = \frac{28}{4 * 10} \% = 70\%$$

Product series	Product type symbol	6-digit assembly part numbers																number of unique parts used in the product 16
		147786	108490	100712	108854	120202	130646	109142	121779	110737	122577	108864	100332	119558	110439	155852	100837	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
VIMLE	1	592.069.14	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	7
	2	192.070.10	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	15
	3	292.114.60	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	16
	4	292.052.99	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	6
	5	192.070.72	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	14
	6	292.115.92	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	13
number of products in which the part was used (max 4)		5	3	6	6	6	6	6	4	4	4	4	4	4	4	4	1	71

Fig. 9. The matrix of standardisation saturation for the VIMLE series

Source: authors' analysis based on furniture assembly instructions from the manufacturer's website: www.ikea.com/pl in the first quarter of 2018

The indicator value for the VIMLE series:

$$Ins = \frac{\sum x}{Pn * Am} \% = \frac{71}{6 * 16} \% = 74\%$$

Clearly, the values of the standardisation saturation indicator vary for the different furniture series and range from 58% for the KIVIK series to 100% for VALLENTUNA.

As Figure 5 clearly shows, the picture is decidedly bleaker if standardisation of assembly parts across different product series is considered. None of the assembly parts was found to be universal enough to be used in the assembly of all sofas within the 4 studied product series. To refine the analysis of the level of standardisation of assembly parts used in products representing different product series, one type of product was selected based on the following criteria:

- A two-seat sofa; in the absence of a two-seat sofa, a three-seat sofa,
- fabric upholstery or fabric cover,

Products that met the above criteria, where each represented one of 12 different product series, were analysed. The matrix of standardisation saturation for the analysed group of products is presented in Figure 10.

Product series	Product type symbol	6-digit assembly part numbers																																										number of unique parts used in the products (max42)		
		10037	110439	100712	114509	121103	110019	117175	100854	121236	311526	100178	101350	117142	117450	122545	105509	131289	108014	130911	119577	130913	106629	130914	159169	192241	159176	130646	147786	109142	120208	100109	100559	105103	191109	121779	110737	122577	104864	100932	120075	155832	139454			
EKTORP	1	191.291.83	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	5		
KIVIK	2	490.114.17			+			+	+	+	+																																		5	
KLIPPAN	3	892.517.83			+	+																																							4	
KARLSTAD	4	798.404.95			+			+	+	+			+	+	+																														8	
TIDAFORS	5	602.052.49			+				+	+	+					+	+	+																											7	
STRANDMON	6	003.254.43																+	+																										2	
KNOPPARP	7	003.242.74																	+	+	+	+	+	+																					5	
DELAKTIG	8	592.596.91																									+	+	+	+																3
VIMLE	9	492.069.19			+					+																						+	+	+	+										5	
YPPERLIG	10	303.465.90				+					+																						+	+	+	+	+								4	
GRONLID	11	292.562.98		+	+					+																																			13	
LANDSKRONA	12	392.703.26																																+	+	+	+	+	+	+	+	+	+	+	+	1
number of products in which the part was used (max 12)	1	2	7	2	1	3	3	6	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	62	

Fig. 10. The matrix of standardisation saturation – two-seat sofas in different product series

Source: authors' analysis based on furniture assembly instructions from the manufacturer's website: www.ikea.com/pl in the first quarter of 2018

The indicator value for sofas in the 12 different series:

$$Ins = \frac{\sum x}{Pn * Am} \% = \frac{62}{12 * 42} \% = 12\%$$

The level of repeatability in this case was significantly lower than for products within the same product series. Further analysis to estimate the percentage of assembly parts used in one product only, in two, three, and n-number of products was performed. The results for two-seat sofas as well as for all products in the four selected series are illustrated in Figure 11.

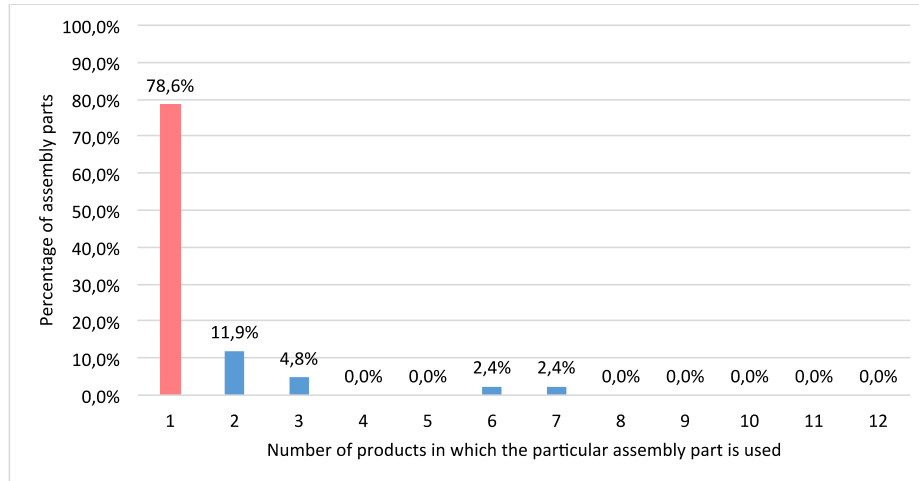


Fig. 11. Percentage of assembly parts used in n- products for 2-seat sofas from the 12 series

Source: authors' analysis based on furniture assembly instructions from the manufacturer's website: www.ikea.com/pl in the first quarter of 2018

It is obvious that assembly part standardisation is at a very low level when one product type in many different series is analysed. Nearly 80% of assembly parts are used in one product only, which means they are product-specific.

The situation is considerably different when different variants of products within the same series are analysed. The results of such analysis are presented in Figures 12-15.

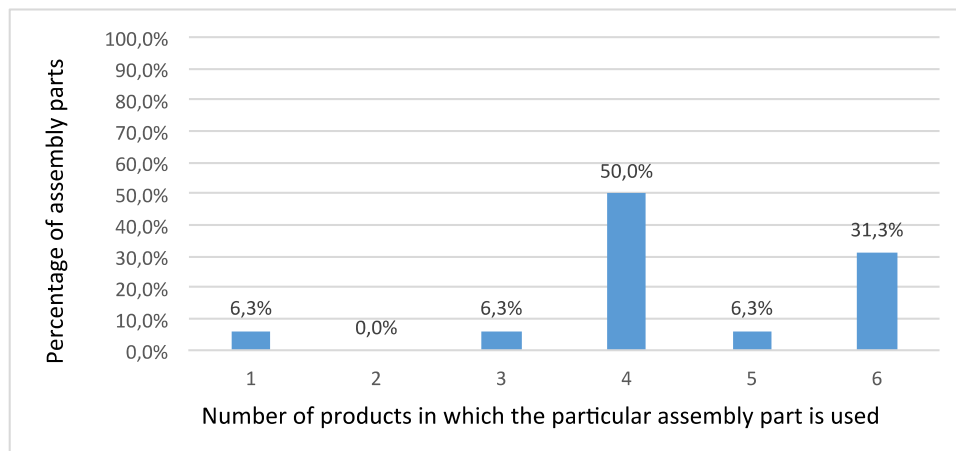


Fig. 12. Percentage of assembly parts used in n- products for the VIMLE series

Source: authors' analysis based on furniture assembly instructions from the manufacturer's website: www.ikea.com/pl in the first quarter of 2018

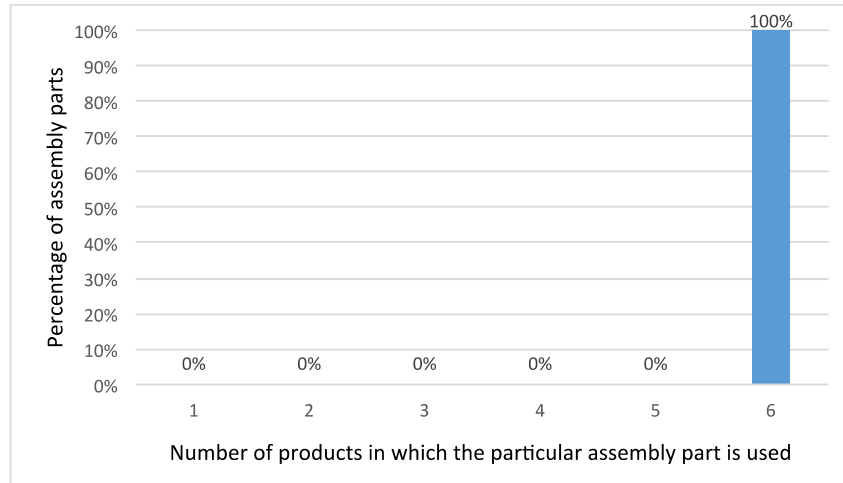


Fig. 13. Percentage of assembly parts used in n- products for the VALLENTUNA series

Source: authors' analysis based on furniture assembly instructions from the manufacturer's website: www.ikea.com/pl in the first quarter of 2018

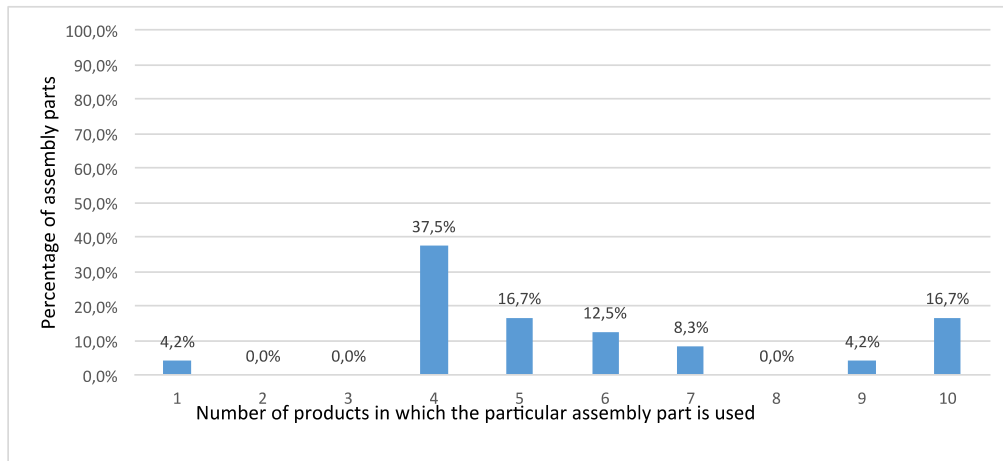


Fig. 14. Percentage of assembly parts used in n- products for the KIVIK series

Source: authors' analysis based on furniture assembly instructions from the manufacturer's website: www.ikea.com/pl in the first quarter of 2018

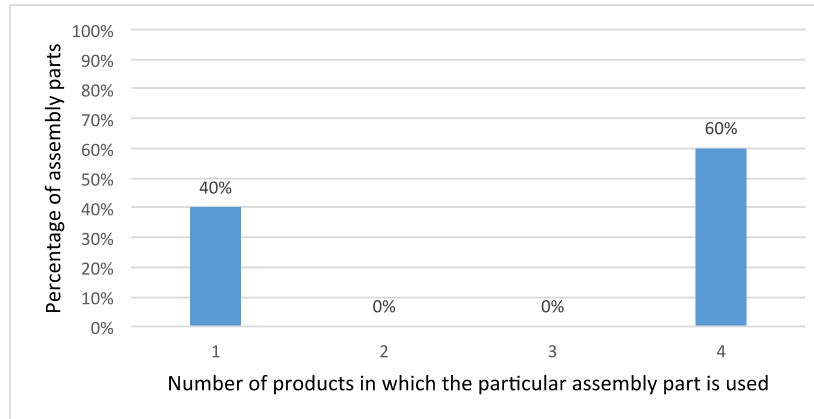


Fig. 15. Percentage of assembly parts used in n- products for EKTROP series

Source: authors' analysis based on furniture assembly instructions from the manufacturer's website: www.ikea.com/pl in the first quarter of 2018

The analysis of each product series reveals a rather diversified picture: from an ideal case of the VALLENTUNA series where each assembly part is used in each of the six products to the EKTROP series where 40% of the assembly parts are only present in one product whereas, at the same time, the remaining 60% feature in all the analysed product variants. For the KIVIK and VIMLE series, on the other hand, significant variability in the use of assembly parts across various product types is observed.

The analysis confirmed a prior conclusion that repeatability of assembly parts, although fairly varied across the different series, is still evident at the level of individual product series.

Therefore, the results allow us to assert that standardisation is important for the studied enterprise (IKEA has been making efforts toward the standardisation of assembly parts within product series), however, there is still considerable potential for optimization.

Although the analysis presented above is preliminary, it clearly reveals an enormous, exploitable potential for standardisation of assembly parts used in particular product groups. Also distinctly apparent is a significant dependence of product modularity and the level of assembly part standardisation. The VALLENTUNA series, for which the level of component standardisation is 100%, is marketed by IKEA as "Our most flexible sofa. Ever". Products in this series include modules for sitting, sleeping, and storage, and enable the customer to upgrade or convert furniture items to alternative uses – including conversion of sofas to beds, replacement of armrests, etc.

Conclusions

In the paper, we put forward a thesis that real progress in closing the loop in the furniture supply chain can only be realized through a long-term strategic approach to implementing the demands of circular economy on the part of the industry coupled with active consumer engagement. At the same time, we looked for practical solutions that would be relatively straightforward for business organisations to apply immediately. For that reason as well as due to the visible scarcity of analysis and business activity in this area (most of the observed activities and analyses have concentrated on products rather than parts and components), in our primary research, we focused on standardisation as regards components and parts used in ready-to-assemble furniture.

We proposed different models that rely on the varied engagement of consumers, furniture producers/retailers, and external contractors in the process of closing the loop, and we have recommended those that we deem to have the greatest potential in the context of a circular economy.

We have found that the most advantageous for the implementation of a circular economy is the model in which the manufacturer implements a strategic system of planning product circularity performance based on quantitative reduction of virgin raw materials but also intermediate products in finished products. In the model, 3R processes need to be planned from the very beginning of the product design process and a strategic system for reuse of recovered raw materials, materials, and components in new furniture needs to be developed.

The model requires not only a strategic organisational approach that relies on a high level of component standardisation but also on effective sourcing of used/unwanted furniture and its components from the market. The model is highly unlikely to be effective unless consumers are engaged and the level of standardisation of components and parts is high.

Therefore, we have also suggested a consumer engagement model that appears the most preferable because of the cost and convenience for the manufacturer/retailer as well as the potential for retrieving furniture from the market. In this model, the consumer is highly engaged and active, willing to disassemble the furniture as well as to transport it to the manufacturer.

The manufacturer gains a lot but needs to implement effective consumer incentive programs including reward/discount systems, develop user-friendly disassembly manuals, and establish and maintain good communication with consumers. Indispensable for this purpose would be systematic analysis to enable an adequate understanding of consumer attitudes, motivations, and behavior mechanisms. On this account, and in the face of a scarcity of existing analyses that could facilitate a better understanding of furniture consumer behavior in the context of a circular economy, the authors intend to study this area further in their future research.

In the final part of this article, the authors assessed the level of standardisation of assembly components used in ready-to-assemble furniture for the selected product group (sofas) of the global, leading furniture producer and retailer (IKEA), and accordingly, determined the scope of potential improvement in this area. It has been found that at the level of specific product series, standardisation defined as the level of repeatability of assembly parts used in products is noticeable, however, as the analysis has also revealed, it varies significantly across different product series, which leaves room for further improvements. This exploitable potential for standardisation of assembly parts is even more apparent when products from different series are included in the analysis.

Taking into account that the studied furniture manufacturer and retailer – IKEA, has already taken some steps towards product modularity and standardisation and the fact that IKEA customers have long been accustomed to self-assembling the furniture they purchase from IKEA, we have reasons to think that the solutions proposed in the paper are highly likely to be successfully implemented in practice.

Limitations and future research

The limitations of the study are related to the following aspects: first of all, the analysis was based on one manufacturer and it did not include all product groups. Secondly, the assessment of the potential for standardisation relied on one aspect only: the level of repeatability of assembly parts used in ready-to-assemble furniture. In the proposed indicators, we did not consider the quantities of the assembly components or the measure of statistical dispersion in the standardisation saturation matrix. Nor did we explore aspects connected with product and assembly parts construction. The indicators used in the analysis did not take into account the production- and logistics-related costs of standardized elements. Those aspects should be analysed further to minimize the number of part types used in different product variants in different product series and part reuse

potential, providing an appropriate level of safety and usability. Despite these limitations, the proposed research method allowed the authors to accomplish the objectives set for this stage of the research, and to formulate preliminary conclusions.

The article also aimed to present a closed-loop supply chain model for the furniture industry and different models (scenarios) implying varied engagement of consumers, furniture manufacturers/retailers, and external contractors in closing the loop. This was performed based on the literature review and observation of industry practices in this area. In their further research, the authors plan to empirically verify the assumptions made in the models and to confirm the initial recommendations. Therefore, the next step will involve an assessment of consumer engagement in disassembling, sorting, and transporting furniture they no longer need. Appraisal of factors determining consumer behavior in this regard will be the primary goal.

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Malgorzata KOSZEWSKA is an Associate Professor and the leader of the Sustainability & Circularity Research Team at the Faculty of Management and Production Engineering at Lodz University of Technology, Poland. Her current research interests include sustainable production and consumption, textile and clothing market, consumer behavior towards sustainable products, circular economy, customer quality perception. She earned her Ph.D. in textile engineering at the Faculty of Material Technologies and Textile Design, Lodz University of Technology and her post-doctoral degree (habilitacja) in economics and commodity science at Poznan University of Economics and Business.

ORCID ID: <https://orcid.org/0000-0002-8324-4937>

Maciej BIELECKI currently works at the Department of Production Management and Logistics, Lodz University of Technology. His research interests include production engineering, logistics, supply chain management, and manufacturing.

ORCID ID: <https://orcid.org/0000-0001-6550-3512>

Register for an ORCID ID:

<https://orcid.org/register>

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HOW REGULATION OF BANK CAPITAL ADEQUACY AND LIQUIDITY AFFECTS PRICING OF BONDS OF THE BANKS

Aida Tatibekova ¹, Mukhtar Bubeyev ²

^{1,2} "Turan" University, Satpaeva Street, 16a, Almaty, 050013, Kazakhstan

E-mails: ¹aida_tatibekova@mail.ru; ²mukhtar@bk.ru

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Abstract. The article discusses the evolution of regulation of banks in Kazakhstan before and after financial crisis of 2007-2008. The purpose of the article is to examine how introduction of Basel III standards on capital adequacy and liquidity affected pricing of bonds of Kazakh banks. In general, post crisis reforms in the banking system, mainly Basel III standards, enhanced capital adequacy and liquidity of the banks. Banks now tend to hold more capital and high-quality liquid assets compared to pre-crisis period. Our analysis showed that banks with better liquidity conditions would receive cheaper funding via bonds compared to other banks. We found that bond prices reacted explicitly to the changes in liquidity requirements, rather than capital measures. New capital adequacy measures seem to be less constraining for banks with government support. In contrast, changes in capital measures made substantial impact on bond spreads of banks without government support, these banks actively increased their capital in post crisis period.

Keywords: capital adequacy; liquidity; crisis; risks; pricing

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JEL Classifications: G10, G12

1. Introduction

The financial world has changed irrevocably since global financial crisis of 2007-2008. In response to the crisis, central banks in many countries across the globe introduced Basel III standards aimed at improving the quality of banks' capital and adding countercyclical and conservational buffers (Basel Committee on Banking Supervision, 2018). The Basel III standards also focused on liquidity coverage and stable funding issues in light of the problems with tight liquidity and overreliance on short term funding.

This article examines how implementation of Basel III standards on capital adequacy and liquidity affected the perceived risk of banks in Kazakhstan via pricing of their bonds. Consistent with other research, banks with superior liquidity would receive cheaper funding through bonds compared to other banks. Bond spreads captured changes in liquidity measures better than capital adequacy measures. Additionally, we split the sample banks into

two groups based on their implicit government support and examined how Basel III standards affected each group. Finally, we add the results obtained to existing theoretical literature on asset pricing and financial stability.

2. Literature Review

The global financial crisis of 2007-2009 started as a subprime mortgage crisis in the USA, had dramatic negative consequences for global economies. Many economists compare the crisis with a Great Depression both in scope and depth. However, according to Gorton and Metrick (2012), its novelty relates to the financial crisis taking place in “shadow” banking sector. Securitization, money market, mutual funds and repurchase agreements are among specific features of the new crisis. Gorton (2018) noted that all countries with market economies are still vulnerable to global crises due to massive short-term debt and potential maturity mismatch.

N. Frank and H. Hesse (2009) argue that financial contagion hit EM countries, with further spillover to the real sector resulting in export and GDP growth rates fall as well as decrease in global trade finance. Cetorelli and Goldberg (2011) found that a contraction in cross-border lending by foreign banks had a substantial impact on lending from developed markets to emerging markets. Kazakhstan was not an exception. According to IMF survey of Kazakhstan (IMF, 2010), the oil rich country enjoyed stable foreign investments with annual GDP growth at 10% during 2000-2007. Kazakh banks made massive borrowings from foreign banks to finance construction and real estate. With onset of the global financial crisis the capital inflows into Kazakhstan run short, which negatively affected credit growth and collapsed asset prices. The banking sector experienced serious problems due to slowdown of economy and large credit exposure in foreign currency. Some local banks had to restructure their external debts, and the number of nonperforming loans increased. Besides, Kazakh banks were forced to raise interest rates on their loans and tightened up lending conditions, which in turn reflected in shrinking of lending to local economy (Annual Report of the National Bank of Kazakhstan for 2008).

Another big issue with global financial crisis relates to poor liquidity risk management across many developed and developing economies. Basel Committee on banking supervision noted that many banks failed to have sound liquidity risk management framework with misaligned business incentives and risk tolerance (Basel Committee on Banking Supervision, 2008).

In response to the crisis regulators across the world took a range of measures such as injection of liquidity, recapitalization of banks, interest rates cuts etc. In Kazakhstan the government among other measures recapitalized four systemic banks as they run out of liquidity and failed to roll over their debts in foreign currency (Resolution of the Government of the Republic of Kazakhstan, 2008).

Another popular form of policy response to financial crisis was implicit government guarantees of bank debts. According to Schich and Lindh (2012) the guarantees are associated with the banks that are ‘too big to fail’. The authors claim that (value of) implicit guarantee is costly for the banks with low creditworthiness, besides it depends on ‘creditworthiness of its government and the size of the bank’. Schich and Aydin (2014) argue that the value of implicit bank debt guarantees is huge. They found that in absolute terms, preliminary funding cost advantages may reach USD 10 billion annually for banking sectors in some countries and may amount to 1% of domestic GDP or 3% in crisis situations. Tsismelidakis and Merton (2015) studied the cost of implicit guarantee and found that too-big-to-fail banks purposefully took advantage of their new privilege and switched to short-term bonds as compared to non-guaranteed banks that prefer long-term debt in the time of financial distress.

However, Correa, Lee, Saprizza and Suarez (2012) argue that banks that plan to receive government support tend to have negative excess returns after sovereign rating downgrades, in particular in the developed economies.

The crisis of 2007-2009 has been thoroughly examined from different angles, including the role of liquidity and leverage in magnifying the crisis. For instance, Adrian, Boyarchenko, and Shin (2015) analyzed impact of book equity in lending decisions of the banks and how they realign balance sheets in the short and long terms. They found out that the way banks manage their capital and liquidity amplifies financial distress. Pierret (2015) in her work examines an interaction between solvency and liquidity risks of banks. She revealed that banks are denied access to short-term liquidity when they are expected to be insolvent in times of distress, so called 'solvency-liquidity nexus'. Pierret argued that among other things, capital helps to make creditors confident to provide funding to the banks in financial distress. Sheng-Hung Chen (2013) argues that bank regulation of capital and competition significantly enforce productivity (and profitability) of the bank, and close supervision is associated with higher bank productivity.

The efficient markets hypothesis states that efficient market asset prices fully reflect all information argued Fama (1969). Changes in regulation of capital adequacy and liquidity of the banks led to adjustments of banks' balance sheet. Market reacted to these changes by charging premiums or discounts to securities issued by the banks. Besides, Morgan and Stiroh (2000) and Jagtiani, Kaufman and Lemieux (2002) studied relationship between a bank's risk profile and funding costs, the found that debt spreads reflect financial condition of the issuing bank. In our paper, we examine the impact of the regulatory changes of Basel III standards on banks' perceived risks via bond debt spreads.

3. Pre-crisis problems in Regulation

Prior to crisis the macroeconomic situation in Kazakhstan was quite favorable. The international economy and trade demonstrated stable growth. The prices for oil, metals and wheat grain – Kazakhstan's main export items were high. The GDP of Kazakhstan was growing at around 10% per annum in 2005-2007. Foreign debt of the government in January 2006 was low at 2,5% of GDP. These indicators supported a steady inflow of foreign currency leading to a stable exchange rate.

Real estate prices were rising rapidly indicating a boom. In 2007 they peaked at levels of 500-1000% to prices of 2001. Between 2005 and 2007 the construction sector was increasing at the average rate of 37% (Financial Stability Report of Kazakhstan 2007).

The financial sector was dominated by banks. In 2007 the banking sector consisted of 34 banks with 5 banks concentrating around 78% of total assets. Banking loans in Kazakhstan were growing at annual rate of 58% during 2002-2006 and reached +86% by September 2007. In the same period loans-to-GDP ratio rose from 20% to 60%. A significant part of that growth was attributed to the growth in the real estate sector. Profitability was high, as of October 2006 ROA reached 2.3% and ROE – at 23.9%.

Banks were enjoying high credit ratings and this allowed them to access foreign capital markets to fund the credit growth. By 2008 the level of foreign debt of banks reached 50%.

The Financial Supervision Agency of the Republic of Kazakhstan introduced Basel I capital requirements in early 2000s. The ratios were higher than recommended by the Basel Committee, reflecting higher credit risk of the country.

As defined in Financial Stability Report of Kazakhstan (2007), the regulator introduced new requirements on credit provisioning in April 2007 as a result of:

a) Prices for real estate were growing at very high rate and the collateral was overvalued. The new requirements placed more focus on the client's financial situation, especially for real estate mortgages;

b) Banks were borrowing in foreign currency and passing currency risk onto their clients to maintain open currency positions. In 2004-2006 over 50% of loans were denominated in foreign currency. As clients did not have foreign currency income, the currency induced credit risk increased dramatically. The new requirements placed higher provisioning requirements for unhedged clients.

Two additional capital requirements were introduced linking capital with short and long-term foreign debt. With respect to capital adequacy measures, k1 ratio was set at 6%, and k2 ratio – at 12% (for a bank with a holding company 5%, 10% respectively).

Liquidity requirements consisted of current liquidity ratio, short-term liquidity ratio and minimum reserve requirements.

Current liquidity ratio (highly liquid assets/demand liabilities) was set at 30% and short-term liquidity ratio (three-months assets/three months liabilities) was set at 50%. Minimum reserve requirements for banks were set at 6% for internal liabilities, and 8% - for other liabilities.

4. Post-crisis Reforms in Regulation

In 2006 the National Bank of Kazakhstan reformed minimum reserve requirements for banks by splitting them into two groups: as percentage of domestic and foreign liabilities, reflecting the concern of high level of foreign borrowing by banks. The domestic liabilities remained at 6% and foreign liabilities were charged at a higher 8% level. As the crisis unfolded and liquidity pressures increased the regulator lowered both domestic and foreign liabilities reserve requirements to 5% and 7% (respectively) in August 2008, 2% and 3% in December 2008 and 1.5% and 2.5% in March 2009. Later the requirements were further split into short term and long term. In 2015 the requirements were divided into domestic and foreign currency. In the same year the National Bank of Kazakhstan made a transition to inflation targeting monetary policy and set the short term base rate (Monetary policy of the Republic of Kazakhstan until 2020, 2015).

To assess the soundness of banking system in 2013 the National Bank of Kazakhstan conducted the stress testing of capital adequacy of sample banks to changes in credit risks in case of negative shock of oil prices. The results showed that by the end of 2014 out of 30 sample banks 4 banks were expected to violate capital adequacy ratio (k2), by the end of 2015 –10 banks would breach tier 1 capital ratio (k1-2), and 11 banks would breach capital adequacy ratio (k2). The results of stress testing imply that by the end of 2015 capital adequacy ratio (k2) would decline to 0.087 (minimum - 0.10), and tier 1 capital ratio (k1-2) to 0.036 (minimum - 0.05), respectively (Financial Stability Report of Kazakhstan, 2013).

In order to mitigate systemic risks in future, the National Bank introduced a new model of banking regulation to be implemented from 2015. In the framework of Basel III the regulator planned introduction of liquidity ratios and changes in capital adequacy ratios during 2015-2019 (with higher levels than Basel III standards).

Capital adequacy ratios became more accommodative by decreasing total capital from 12% to 7.5%, and then planned gradual increase until 2019 (tier 1 capital from 6% to 9% and total capital from 7.5% to 12%).

Additionally, the regulator planned the introduction of the following buffers:

- conservation buffer (increase since 2015 from 2.5% to 3% for systemic banks, and from 1% to 3 % for other banks),

- countercyclical buffers (introduction not less than 12 months before the date of buffer calculation, from 0% up to 3%).
- systemic buffer, formed by systemic banks and funded with stock and net retained income (1% as of January 2016).

This approach was justified by higher volatility of economic growth of Kazakhstan along with high systemic and institutional risks of its financial institutions. The purpose of these regulatory changes was to build up banks' capacity to absorb potential losses.

However, in 2015 the dates of transition to Basel III standards were revised with keeping minimal levels of capital adequacy of banks in 2016 at levels set for 2015, and 2017 – at levels set for 2016. The regulator decreased requirements for capital adequacy for loans to small and medium enterprises, mortgage loans and defaulting loans. In 2016 the targeted value of capital adequacy ratio was lowered from 12% to 8%. As of January 2017 capital adequacy ratios conform with Basel III standards.

According to the Annual Report of the National Bank of Kazakhstan (2016), the regulator in 2016 introduced new liquidity ratios – liquidity cover ratio (LCR) and net stable funding ratio (NSFR). These liquidity ratios help to ensure sustainability of the banks to potential liquidity shortage and decrease their dependence on short term funding. The banks calculated the liquidity coverage ratio during one-year monitoring period, and then starting from second half of 2017 this ratio became obligatory with 60% level, with gradual increase by 2021 up to 100%. These regulatory changes reshaped the banking sector of Kazakhstan, with banks adjusting their balance sheets to meet new requirements in capital adequacy and liquidity measures.

In this paper we examine how these changes affected the banks through their bond prices. We used the approach kindly suggested by Colleen Baker, Christine Cumming, Julapa Jagtiani in their work 'The Impacts of Financial Regulations: Solvency and Liquidity in the Post-crisis Period' (2017).

5. Data

We divide our sample of banks into two groups based on their implicit government support. In the first 'government dependent' group we include two large banks with implicit government guarantee: Halyk Bank (Halyk) and Kazkommertsbank (KKB).

The second group focuses on 'independent' banks that never received government guarantee and includes Fortebank (FB), Kaspi Bank (KB), Bank Center Credit (BCC) and Eurasian Bank (EB).

1) Accounting Data

We use accounting data from banks' reports to the central bank for the period of 2008-2018.

For liquidity measures, we use two actual liquidity ratios: k_4 and k_{4-2} . Current liquidity ratio (k_4) ratio is calculated as a ratio of monthly average of highly liquid assets to monthly average of demand liabilities.

Liquidity ratio (k_{4-2}) is a ratio of monthly average of liquid assets, including highly liquid assets, with maturity up to 1 (one) month to monthly average of liabilities with maturity up to 1 (one) month.

For capitalization, we use actual capital adequacy ratio (k_2) – a ratio of a bank's equity to its risk weighted assets.

2) Market Data

The choice of bond spreads over government bond yields as a measure of financial friction is widely used by a number of researchers, including the works of Evanoff, Jagtiani, and Nakata (2011), Beyhaghi, D'Souza and Roberts (2013) and Santos (2009). We applied data on publicly traded bonds issued in USD on global capital markets (Eurobonds) by the sample banks. The bonds in USD were chosen due to illiquidity of corporate bonds in domestic capital market.

We use the yields of the bonds issued by sample banks to calculate the yield spreads by subtracting the matching sovereign credit default swaps (CDS) yields from Bloomberg. The CDS is used as a proxy for government bonds of Kazakhstan in USD due to the absence of such bonds during 2008-2014. The government bonds of Kazakhstan in USD were issued in 2014 after a long break (Farchy & Moore, 2014).

6. Method

We made separate regression analysis for two sample groups to find answers to the following: whether and how changes in regulation of capital and liquidity requirements affected the perceived risks of the banks (via bond yields) based on their 'dependence' on government support. Additionally, we shall look at how the failure of a large bank (BTA), previously perceived as a government-backed bank, affected the bond yields of sample 'government dependent' banks.

Tests performed: to estimate the impact of risk factors of capital adequacy (k2 ratio) and liquidity (k4 and k4-2 ratios) on bond spreads the panel data analysis was used. This method allows to consider interrelation of each indicator in the system. Taking into account incomplete time-series data on some banks for the period observed, imbalanced panel data approach was applied. We performed Hausman test to find suitable models for each bank group:

A) Fixed effect model

B) Random effect model

Hausman test showed inconsistency of Random effect model (prob of Chi-Sq. Statistic =0) for both groups as random effects may be correlated by one or two regressors. Therefore, we chose Fixed effect model. The result was tested by Likelihood Ratio. In groups the normality of the model confirms that errors are normally distributed. White cross-section standard errors & covariance (no d.f. correction) when specifying the model allows to obtain result free from autocorrelation of remains.

7. Results

The purpose of our regression analysis is to examine relationship between debt spreads and risk factors (capital adequacy and liquidity ratios) between 2008 and 2018. We run separate regressions for dependent and independent groups of banks. For the measures of capital, we use k2 ratio, for liquidity measures we use k4 and k4-2 ratios. The results are reported in Annex 1.

Based on the model results we found that k2 and k4 ratios are statistically significant for both Groups while k4-2 turned out to be not significant for both Groups.

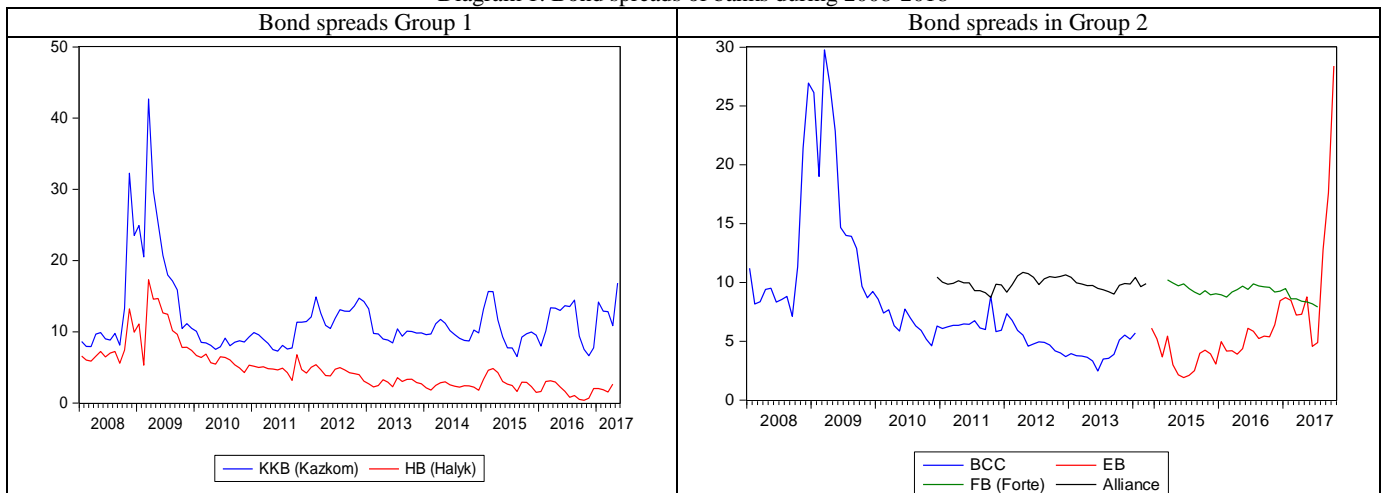
With respect to capital adequacy measure, banks from both groups gradually built up k2 ratios in 2009-2010 and ended up with more higher quality capital on their balance sheets. According to Annex 1 (Results, Group 1),

capital adequacy ratio (k2) showed negative correlation (-36.7) in Group 1. Surprisingly, the ratio of capital adequacy (39.6) in Group 2 positively affected the price as showed in Annex 1 (Results, Group 2). Capital adequacy measures (k2 ratio) had no effect on prices, which implies that market doesn't perceive them as capital strength measures. This is backed with Pierret research (2015), who argued that the stress test results would be more relevant for the market than capital ratios. However, Schmitz, Sigmund and Valderrama (2019) found that increase in regulatory capital ratios leads to decrease in cost of funding for banks.

As for liquidity measures, in post crisis period all banks increased holdings of high quality liquid assets as seen from bank's reports to the regulator. Based on results of the model it becomes clear that market reacts to changes in liquidity measures rather than capital adequacy ratios (via bond prices). This seems logical since liquidity ratios capture market fluctuations much better. As expected, the banks with good liquidity supply (namely, Halyk) had advantages and priced cheaper than banks with less liquidity. So, in both Groups current liquidity ratio (k4) positively affected bond spreads (1.67 and 1.06) according to Annex 1 (Results, Group 1 and Group 2).

Bond spreads in both Groups soared during crisis in 2008-2009. Later, bond spreads decreased and stabilized to some extent. Expectation that banks with explicit government guarantee shall be perceived as creditworthy and thus have lower spreads is not supported as seen in Diagram 1 which shows spreads of the banks in Group 1 (namely, KKB) were higher than spreads of Group 2 (namely, BCC). This could be best explained by the failure of one the largest local banks BTA Bank which nearly defaulted in 2009 (Prentice & Cohn, 2012), and investors preferred to get rid of the bonds of government related banks and added large risk premia.

Diagram 1. Bond spreads of banks during 2008-2018



Conclusion

Based on our analysis one may claim that the regulatory changes in capital adequacy and liquidity requirements have significantly affected local banks, with some differential impacts on government dependent versus independent banks.

However, in general, bond prices reacted more to the changes in liquidity measures rather than changes in capital adequacy measures.

Changes in regulation of liquidity affected the bond prices of both bank groups. Furthermore, the failure of a large government-backed bank (BTA) amplified the credit risks for the sample banks with government guarantee.

New capital measures seem to be less constraining for banks with government support, however, they continued to increase capital in post crisis period. In contrast, changes in capital measures affected bond spreads of banks without government support. These banks actively enhanced their capital during 2008-2009. Bond spreads of banks in both groups rocketed in 2008 and 2009, the prices fluctuated later but in smaller ranges.

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Annex 1

Correlated Random Effects - Hausman Test (GROUP 1)

Equation: LSR

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	242.968231	1	0.0000

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
K4	1.881170	1.760900	0.000060	0.0000

Cross-section random effects test equation:

Dependent Variable: SPREAD

Method: Panel Least Squares

Date: 01/27/19 Time: 14:08

Sample: 1 225

Periods included: 113

Cross-sections included: 2

Total panel (unbalanced) observations: 225

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.930959	0.309404	19.16898	0.0000
K4	1.881170	0.166943	11.26836	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.614894	Mean dependent var	8.230584
Adjusted R-squared	0.611425	S.D. dependent var	5.596080
S.E. of regression	3.488360	Akaike info criterion	5.349984
Sum squared resid	2701.442	Schwarz criterion	5.395532
Log likelihood	-598.8732	Hannan-Quinn criter.	5.368368
F-statistic	177.2327	Durbin-Watson stat	0.700766
Prob(F-statistic)	0.000000		

Redundant Fixed Effects Tests (GROUP 1)

Equation: EQ_GROUP1_FE

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	134.255745	(1,220)	0.0000
Cross-section Chi-square	107.188099	1	0.0000

Cross-section fixed effects test equation:

Dependent Variable: SPREAD

Method: Panel Least Squares

Date: 01/29/19 Time: 07:30

Sample: 2008M01 2017M05

Periods included: 113

Cross-sections included: 2

Total panel (unbalanced) observations: 225

White cross-section standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	23.58500	2.241268	10.52306	0.0000
K2	-98.82854	11.16151	-8.854407	0.0000
K4	1.204184	0.560391	2.148828	0.0327
K4_2	-0.296719	0.134841	-2.200503	0.0288
R-squared	0.409238	Mean dependent var	8.230584	
Adjusted R-squared	0.401218	S.D. dependent var	5.596080	
S.E. of regression	4.330303	Akaike info criterion	5.786770	
Sum squared resid	4144.086	Schwarz criterion	5.847500	
Log likelihood	-647.0116	Hannan-Quinn criter.	5.811281	
F-statistic	51.03094	Durbin-Watson stat	0.332884	
Prob(F-statistic)	0.000000			

Correlated Random Effects - Hausman Test (GROUP 2)

Equation: Untitled

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	16.845557	3	0.0008

** WARNING: estimated cross-section random effects variance is zero.

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
K2	39.642158	16.817291	166.683334	0.0771
K4	1.064564	1.036641	0.001219	0.4239
K4_2	-0.060025	-0.087546	0.001322	0.4491

Cross-section random effects test equation:

Dependent Variable: SPREAD

Method: Panel Least Squares

Date: 01/29/19 Time: 08:08

Sample (adjusted): 2008M08 2017M10

Periods included: 103

Cross-sections included: 4

Total panel (unbalanced) observations: 170

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.546986	2.415726	0.226427	0.8212
K2	39.64216	14.88311	2.663567	0.0085
K4	1.064564	0.154020	6.911865	0.0000
K4_2	-0.060025	0.059423	-1.010136	0.3139

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.342325	Mean dependent var	8.460939
Adjusted R-squared	0.318116	S.D. dependent var	4.672975
S.E. of regression	3.858768	Akaike info criterion	5.578878
Sum squared resid	2427.084	Schwarz criterion	5.707999
Log likelihood	-467.2046	Hannan-Quinn criter.	5.631273
F-statistic	14.14047	Durbin-Watson stat	0.431782
Prob(F-statistic)	0.000000		

Redundant Fixed Effects Tests (GROUP 2)

Equation: EQ_GROUP2_FE

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	5.615186	(3,163)	0.0011
Cross-section Chi-square	16.719205	3	0.0008

Cross-section fixed effects test equation:

Dependent Variable: SPREAD

Method: Panel Least Squares

Date: 01/29/19 Time: 08:01

Sample (adjusted): 2008M08 2017M10

Periods included: 103

Cross-sections included: 4

Total panel (unbalanced) observations: 170

White cross-section standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
K2	16.81729	6.763610	2.486437	0.0139
K4	1.036641	0.299889	3.456754	0.0007
K4_2	-0.087546	0.036377	-2.406616	0.0172
C	4.487891	1.203795	3.728120	0.0003
R-squared	0.274356	Mean dependent var	8.460939	
Adjusted R-squared	0.261242	S.D. dependent var	4.672975	
S.E. of regression	4.016469	Akaike info criterion	5.641932	
Sum squared resid	2677.916	Schwarz criterion	5.715715	
Log likelihood	-475.5642	Hannan-Quinn criter.	5.671872	
F-statistic	20.92081	Durbin-Watson stat	0.382155	

Prob(F-statistic) 0.000000

Results

Group 1 (KKB, Halyk)

Dependent Variable: SPREAD

Method: Panel Least Squares

Date: 01/29/19 Time: 07:13

Sample: 2008M01 2017M05

Periods included: 113

Cross-sections included: 2

Total panel (unbalanced) observations: 225

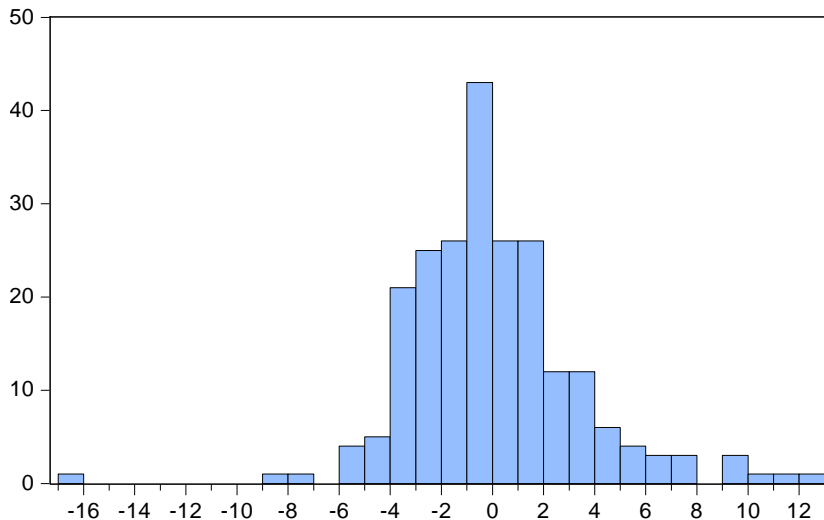
White cross-section standard errors & covariance (no d.f. correction)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	12.13677	2.076063	5.846053	0.0000
K2	-36.73977	10.69163	-3.436311	0.0007
K4	1.669831	0.512602	3.257559	0.0013
K4_2	-0.018221	0.095532	-0.190734	0.8489

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.633125	Mean dependent var	8.230584
Adjusted R-squared	0.626454	S.D. dependent var	5.596080
S.E. of regression	3.420235	Akaike info criterion	5.319267
Sum squared resid	2573.562	Schwarz criterion	5.395180
Log likelihood	-593.4176	Hannan-Quinn criter.	5.349906
F-statistic	94.91462	Durbin-Watson stat	0.519363
Prob(F-statistic)	0.000000		



Series: Standardized Residuals
Sample 2008M01 2017M05
Observations 225

Mean 7.89e-18
Median -0.395173
Maximum 12.59125
Minimum -16.48956
Std. Dev. 3.389560
Skewness 0.339176
Kurtosis 6.508349

Jarque-Bera 119.7063
Probability 0.000000

Group 2 (BCC, EB, FB, ALLIANCE)

Dependent Variable: SPREAD

Method: Panel Least Squares

Date: 01/29/19 Time: 08:01

Sample (adjusted): 2008M08 2017M10

Periods included: 103

Cross-sections included: 4

Total panel (unbalanced) observations: 170

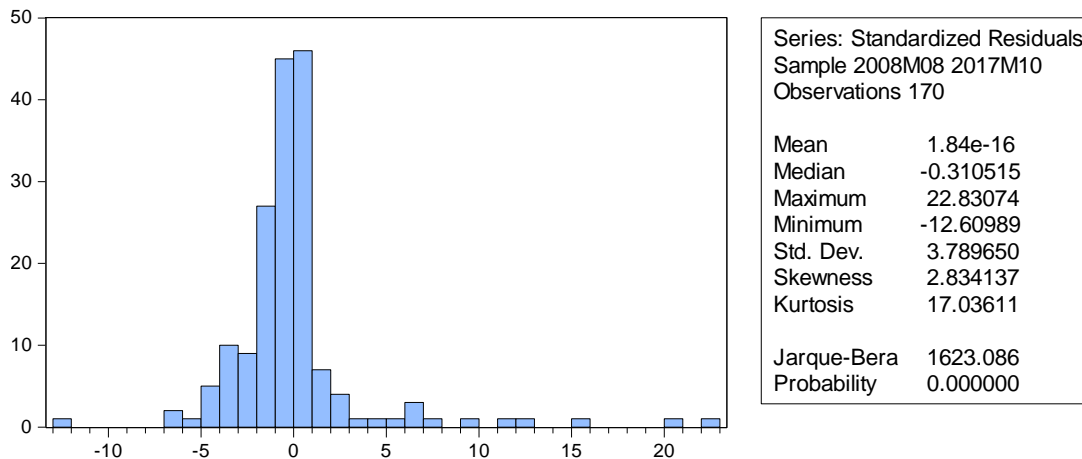
White cross-section standard errors & covariance (no d.f. correction)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
K2	39.64216	12.17377	3.256358	0.0014
K4	1.064564	0.285267	3.731819	0.0003
K4_2	-0.060025	0.048312	-1.242447	0.2159
C	0.546986	1.788807	0.305783	0.7602

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.342325	Mean dependent var	8.460939
Adjusted R-squared	0.318116	S.D. dependent var	4.672975
S.E. of regression	3.858768	Akaike info criterion	5.578878
Sum squared resid	2427.084	Schwarz criterion	5.707999
Log likelihood	-467.2046	Hannan-Quinn criter.	5.631273
F-statistic	14.14047	Durbin-Watson stat	0.431782
Prob(F-statistic)	0.000000		



Workfile Statistics

Date: 01/28/19 Time: 16:52

Name: BOND_DATA_ANALYSIS

Number of pages: 2

Page: group1

Workfile structure: Panel - Monthly

Indices: BANK x DATA

Panel dimension: 2 x 113

Range: 2008M01 2017M05 x 2 -- 225 obs

Object	Count	Data Points
Series	6	1350
Alpha	1	225
Coef	1	750
Total	8	2325

Page: group2

Workfile structure: Panel - Monthly

Indices: BANK x DATA

Panel dimension: 4 x 110

Range: 2008M01 2017M10 x 4 -- 177 obs

Object	Count	Data Points
Series	6	1062
Alpha	1	177
Coef	1	750
Total	8	1989

Aida TATIBEKOVA**ORCID ID:** 0000-0001-5254-5924**Mukhtar BUBEYEV****ORCID ID:** 0000-0002-9173-5656

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THE EU CONCEPT OF THE “STRATEGIC PARTNERSHIP”: IDENTIFYING THE “UNIFYING” CRITERIA FOR THE DIFFERENTIATION OF STRATEGIC PARTNERS*

Eva Cihelková¹, Hung Phuoc Nguyen², Michal Fabuš³, Kristína Čimová⁴

¹ Faculty of Economics and Business, Pan-European University, Tematínska 10, 851 05 Bratislava, Slovak Republic

^{2,3} School of Economics and Management in Public Administration, Furdekova ul. 16, 851 04 Bratislava 5, Slovak Republic

⁴ School of Social and Political Sciences, University of Glasgow, Bute Gardens, Glasgow, G12 8RT, United Kingdom

E-mails:¹ eva.cihelkova@paneurouni.com ; ² phuochung.nguyen@vsemvs.sk ; ³ michal.fabus@vsemvs.sk ;
1100175@student.gla.ac.uk

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Abstract. Strategic partnerships are an essential tool of the common foreign policy of the European Union (EU), which should help fulfil its strategic interest – to be an influential global actor, to share responsibility for global security, and together with partners to respond to the current global challenges. Considering that the EU has not yet defined the nature of the strategic partnership, the first objective of this paper is to identify the instrument from a general perspective and to distinguish it from the default category of cooperation. Linking strategic partnership with legal standards, however, allows for the setting of certain criteria of the concept of strategic partnerships for the EU with other key countries and to determine the variability of possible approaches to the specific concept. To define these criteria and the variety of strategic partnerships set by these criteria, is the second goal of the article. If an adequate alternative approach to the concept of the EU is assigned to each individual strategic partner, which is the third objective of this paper, the results indicate the significant diversity of strategic partners of the EU. Based on obtained results, it can be concluded that in order to clarify the concept of the EU's strategic partnership, it is necessary to take steps that will lead to a gradual convergence of existing forms of strategic partnerships and their focus on strategic issues.

Keywords: Cooperation; Partnership; Comprehensive Partnership; Strategic Partnership; European Union; EU External Relations; United States; Canada; Japan; Russia; South Korea; China; India; Brazil; Mexico; South Africa

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JEL Classifications: F50, F55, F62, P16, P52

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1. Introduction

The European Union started to rely on the Lisbon Treaty at the end of 2009 and has adopted the document “Europe 2020 – A strategy for smart, sustainable and inclusive growth” (European Commission, 2010) in March 2010. In this document, at the end of 2010, it has set out the objective to “be an effective global actor, ready to share in the responsibility for global security and to take the lead in the definition of joint responses to common challenges. A strong economy and internal cohesion will strengthen the European Union’s ability to project its influence in the world. The EU can draw on its firmly-rooted belief in effective multilateralism, especially the role of the UN, universal values, an open world economy and on its unique range of instruments” (European Council, 2010). One of the most important instruments for pursuing European objectives and interests are the EU’s strategic partnerships with key players in the world. These key partners are the United States, Canada, Japan, Russia, South Korea, China, India, Brazil, Mexico and South Africa. The EU also established strategic partnerships with several regional and international organizations, including Africa and the African Union, the Mediterranean and the Middle East, Latin America and the Caribbean – the Community of Latin Americas and Caribbean States (CELAC), the United Nations and NATO. However, the subject of interest in this particular article will only be bilateral strategic partnerships with the ten above-mentioned member countries.

The category of “strategic partnership” has different meanings that often depend on the legal basis on which the partnership is built. From the international legal perspective, it is based on non-contractual or contractual relationships between individual national states, groups of countries or groups of countries with individual countries or international organizations. The partnership between the two parties envisages mutual participation in its establishment, as well as responsibility for sustainment and development. Strategic partnerships work only when they are based on mutual interests and benefits and on the premise that all actors have obligations as much as they have rights. The participation of emerging economies in the international system should allow for the benefits as well as for responsibilities to be distributed evenly (European Council, 2010). During the partnership, problems may arise due to potentially prioritising unilateral interests. If bilateral interests are ignored and neglected, the partnership can weaken and, consequently, lead to its termination. Therefore, the general foundation of a functioning partnership is a good two-way communication between partners.

The European Union, neither in its founding treaties nor in other documents, specified the nature of the strategic partnership. From the EU’s practical approach towards strategic partnerships, three elements are highlighted, which emphasize (Paľasz, 2015: 5): (i) promoting trade and investment, (ii) looking for allies to promote multilateralism and strengthen international cooperation, (iii) burden-sharing in security matters. Due to the incompleteness and inconsistency, the concept of strategic partnership between the EU and other actors is often evaluated as unclear (Sautenet, 2008: 11), imperfect (Paľasz, 2015: 7), and elusive (Maher, 2016: 959). This condition is diligently rectified by mentioned authors, as they propose an interconnection of strategic partnerships with legal measures, ie. by setting certain criteria, which should lead to a conceptualization of strategic partnerships and to the convergence of partnerships with various partners. The “unifying” criteria when applied to a particular strategic partnership, however, prove how much the involved individual projects are differentiated in real terms.

The aim of this paper is, with regard to the facts mentioned above to:

- Firstly, induce a sort of peculiar general definition of the term “strategic partnership”, including answers to two sub-questions, which concern both, the relationship between cooperation and partnership, as well as the sufficient emphasis based on “strategic issues”.

- Secondly, based on the clarification and description of “unifying” criteria to demonstrate variability of possible approaches to the concept of strategic partnership between the EU, which often leads to doubting the effectiveness of such partnerships.
- The third objective of this article is to compare strategic partners according to set criteria and corresponding variant approach to the concept of EU and, from them, a differentiated position is derived in relation to the European Union, including the perception of multilateralism and, therefore, the approach to global governance as well.

These objectives correspond to the three basic sections of the article dealing with gradual defined strategic partnerships as a category; with conceptualisation of the strategic partnership between the EU, and with differentiation of each of the strategic partners according to set criteria and possible approaches towards them. In conclusion, comments are presented, concerning the further development of this vital instrument of common EU foreign policy.

2. General definitions of “partnership”, “comprehensive partnership” and “(comprehensive) strategic partnership

The term “partnership” was used relatively often in the 90s, when the term was used as part of the phrase “partnership for development” by various international organizations (e.g. the World Bank). It referred to the need to restore balance between the North and the South. (Today, it more often refers to the “global partnership for development” (UN, 2015: 7), which means the creation of an environment conducive to development at the national and global levels.)

The European Union first used the term “partnership”, or more precisely “comprehensive partnership” in its Joint Statement “Building a Comprehensive Partnership with China” in March 1998, detailing that: “this Communication seeks to meet that challenge by building ... comprehensive EU-China partnership” (European Commission, 1998: 4). Antoine Sautenet claims, that “in the law of EU external relations, the term takes on the special meaning of a many-sided notion, tending to become a principle of action, a structuring method in the external relations of the EU” (Sautenet, 2008: 11). Moreover, Sautenet adds that “partnership implies at least three characteristics: adherence by partners to a minimum of common benchmarks, equal relations between the partners and the dynamic process for the construction of a common future” (Sautenet, 2008: 11). In principle, therefore, we can say that the “(comprehensive) partnership” can be considered as the development of mutually beneficial cooperation between equal partners, which is based on mutually recognized values (principles) and includes not only various forms of cooperation in trade, but also in many other economic and non-economic areas and is in many cases institutionalized.

In addition, the term “strategic partnership” first appeared as early as in December 1998. The European Council Conclusions session introduced it in the context of the financial crisis in Russia. EU officials had stated “that they considered Russia to be a strategic partner and were therefore willing to help and support the country to overcome its problems, including through food aid” (Pałasz, 2015: 4). This statement was made even though at the time the EU had already developed intensive relations with the US, Japan and Canada. In 2003 the Commission in its Policy Paper (European Commission, 2003) noted in the case of a comprehensive partnership with China that “this partnership was reaching maturity”. The EU comprehensive strategic partnership has not established explicitly the strategic partnership between China and the EU, but it has implied that “the EU and China share responsibilities in promoting global governance”. In the spirit of this statement, both sides should therefore work together “to safeguard and promote sustainable development, peace and stability” (European Commission, 2003: 6).

In December 2003, the Council of the EU adopted the European Security Strategy document “A secure Europe in a better world” (European Council, 2003). The document highlighted the importance of strategic partnerships with key countries and organizations, but without the specific objectives that should be achieved, or list of countries – strategic partners. The document only presented potential strategic partners, among which are the United States as “the irreplaceable partner” and Russia as “a major factor in our security and prosperity”, but also Japan and Canada. Other countries, groups of countries, and international organizations may become strategic partners that “share our goals and values and are prepared to act in their support” (European Council, 2003: 13-14). With “established partners” (USA, Russia, Japan and Canada), strategic partnerships were instituted at the moment of the adoption of the European Security Strategy. Partnerships with emerging countries (China, India, Brazil, South Africa, Mexico, South Korea) were established following the adoption of this strategy.

Because of the above vague identification of (comprehensive) strategic partnerships and strategic partners, Chinese Prime Minister Wen Jiabao in 2004 tried to bring more clarity into the definition (Wen stresses importance of developing EU-China comprehensive strategic partnership, 2004). According to his opinion, “partnership” is defined as cooperation “on an equal footing, mutually beneficial and win-win” (Men, 2007: 6). “Comprehensive” means “all-dimensional, wide-ranging and multi-layered cooperation” (Men, 2007: 6). “Strategic” implies a “long-term and stable ... EU-China relations which transcend the differences in ideology and social system and are not subjected to the impacts of individual events that occur from time to time.” “The two sides should base themselves on mutual respect and mutual trust, endeavour to expand converging interests and seek common ground on major issues, while shelving differences on minor ones” (Men, 2007: 6).

The definition of this mutual relationship with the EU stems from the statement of the European Commission in 2003, encouraging a move “towards a mature partnership” (European Commission, 2003: 6). This new dimension of the “partnership” already appeared in the “Policy Paper on the EU” (State Council of the PRC, 2003), adopted by the Chinese government in October 2003, which was the first document of this kind for a particular country or territory in China’s foreign relations. The document states “that China-EU relations as a whole have been growing stronger and more mature and are now on track of comprehensive and sound development” (State Council of the PRC, 2003: 2). As the Policy Paper on the EU is based on China’s foreign policy, on the one hand it shares common interests with the EU, but on the other hand, it insists on applying the principles which are rooted in different historical and cultural backgrounds, political systems and levels of economic development. (This mostly relates to the enforcement of the “One China” policy, claiming the consolidation of Taiwan with mainland China, the “One Country, Two Systems” principle and the enforcement of the Basic Law, which reflects in Chinese relations with Hong Kong and Macao; as well as diligent adherence to the principle of respecting China’s sovereignty, independence and territorial integrity and non-interference in China’s internal affairs, which is a basis for its relationship with Tibet. It also relates to the general concept of a peaceful, non-conflict foreign policy preferring the so-called soft power approach over the hard power approach etc. (Fürst, 2007: 7-24)) As is apparent from policy decisions and various statements by the European Commission to the Council of Europe and the European Parliament, the EU accepts this reality, and therefore also the principle mentioned in Wen’s definition. The combination of the terms “partnership” and “strategic” introduces a question of priorities in the implementation of joint actions. This also places emphasis on long-term relationships and their stability, which basically corresponds to the partial approaches of a “strategic partnership” defined by the EU.

Nevertheless, the above definition poses some questions both concerning the relationship between cooperation and strategic partnership, as well as the sufficiency of the emphasis based on “strategic issues”. These questions will be answered on the basis of the above definitions of partnerships outlined by Prime Minister Wen Jiabao.

Question 1

Wen Jiabao stated that the concept of a complex partnership stipulates an all-dimensional, wide-ranging and multi-layered cooperation. Our first question then posits whether there is a point at which this level of bilateral cooperation becomes strategic partnership (ie changes its qualitative value in all developed areas) or whether strategic partnership can arise out of an achieved level of cooperation in certain areas only, acting as a mere complement to bilateral cooperation.

Resulting from analysis (Cihelková – Nguyen, 2016), cooperation between the EU and China since 1975, when diplomatic relations were established between the two parties, to present day, has intensified and qualitatively changed, due to both internal developments in the EU and China, and external conditions; mainly as a consequence of increasing globalization, global competition and the changed global situation in the world (decay of the bipolar world). Since 1995, the emphasis is placed on long-term relationship and the three-dimensional features (besides trade and economic relations, also deepened political dialogue, including dialogue on human rights). Implementation of this concept led to the 1998 declaration of comprehensive partnership. Compared to previous stages of cooperation, an emphasis started to be focused on the principles of operation and structuring methods in external relations (creating a hierarchy of political and economic dialogues). In 2003, the EU and China have elevated the comprehensive partnership to a comprehensive strategic partnership.

The strategic nature of the partnership is based on:

- The strategic objectives planned by each party (resulted from conceptual documents of the EU and objectives of Chinese five-year plans and the two so-called Centenary goals) and objectives for the future development of bilateral relations, which were specified in two Policy Papers, adopted in 2003 by both parties (State Council of the PRC, 2003); (European Commission, 2003);
- The nature of instruments through which the following cooperation should be implemented – determining the terms of sectoral agreements, issuing joint declarations or creating dialogues in strategic areas (non-proliferation treaty and arms control, cooperation in the peaceful uses of nuclear energy, the use of outer space – navigation system Galileo, dialogue on intellectual property rights, energy, environment, industrial policy, information society, competition, macroeconomic issues, etc.).
- The common solutions for difficult challenges and sharing a responsibility for their solution. These tasks include: strengthening the UN's role in promoting world peace, security and sustainable development; strengthening cooperation on human rights, dealing with transnational challenges in the field of justice and home affairs, terrorism, regional conflicts, failing states and organized crime.

In addition, relations between the EU and China include not only conflict-free collaboration, but also cover the fields of economy, politics, society and culture in which they suggest disagreements and disputes between the two parties (human rights, the removal of the arms embargo, the fulfilment of the conditions and procedures of the WTO etc.). The Policy Papers include concepts such as: “growing responsibilities”, “competition”, that lead to creation of conflicting opinions on the formulation of a strategic partnership itself.

Therefore, to answer the first question, we can argue that the comprehensive strategic partnerships are not simply the next stage (sequences) of cooperation, which has become all-inclusive (except trade involves economic, political and other collaboration), comprehensive (covering many areas) and multi-level (development at the local, international, multinational, global); but it has evolved from such cooperation only in strategic (security, defensive) areas and global governance. In other words, it relates only to the specific issues and problems, in which both sides not only collaborate but also share responsibility. The cooperation concerns the international level. Strategic partnership is therefore a sort of parallel process to develop an all-encompassing, comprehensive and multi-level cooperation. Renard states that sequence cooperation – partnership – strategic partnership “should be reversed, at the least in part”. This is a new quality only in certain (strategic) issues. “It would be sensible to

start from concrete issues and to assess the added value of respective strategic partnership in each case” (Renard, 2012: 3). Additionally, the strategic partnership reaches beyond bilateral cooperation, because it is characterized by two features: triangulation and variable geometry. Triangulation means cooperation in third regions (countries, regions, etc.), where the EU and its partners have mutual or common interests (example of the cooperation between the EU and China in Central Asia, Africa, the Arctic, etc.). Variable geometry means that the composition of geographic clusters (alliances) between the EU and its strategic partners, eg. in international organizations, varies according to the nature of the problems discussed and according to the interests and advantages that solutions yield to respective partner parties. Political coalitions and their dynamics, therefore, differ depending on the type of problems being addressed at any given time. For instance, the EU has greater coherence in voting with China at the UN in resolving regional conflicts than on security issues and human rights issues. Nevertheless, the diplomatic challenge presents itself to the EU in selective targeting of its efforts to create the widest possible coalitions in addressing its strategic objectives, while maintaining dialogue with those partners who are not party to any coalition and may therefore be in the future, in coalition with the EU. The more coalitions that the EU shares with international partners, the higher is its “strategic” value (Renard, 2012: 3-4).

Question 2

In the second case, our initial point is Wen’s statement that “... EU-China relations which transcend the differences in ideology and social system and are not subjected to the impacts of individual events that occur from time to time” (Men, 2007: 6). “The two sides should base themselves on mutual respect and mutual trust, endeavour to expand converging interests and seek common ground on major issues, while shelving differences on minor ones” (Men, 2007: 6). These allegations then raise our next question of whether these “major issues” are really issues of strategic importance and related to global governance?

To answer this second question is easier – key strategic issues are essential for strategic partnerships. Although strategic partnerships should be comprehensive and should cover the whole spectrum of policies (based on the business and economic concerns), the partnership is only ever truly strategic when it exceeds that basis. It must include an effective, regular and structured architecture of solutions to political and security issues, including joint efforts to find solutions for preventing geopolitical and transnational crises. To this end, the EU introduced the concept of High-Level Strategic Dialogues to only few strategic partners, which also include China (in addition to the US, Canada and India). These summits are only one part of the strategic process. To play an important role in many aspects, they must be part of a structured process.

With regards to this outline, we now try to formulate our own general definition of a comprehensive strategic partnership. “Comprehensive strategic partnership”, as a high degree of maturity of relations between the two parties, is a foreign policy concept, including equivalent, mutually beneficial and institutionalized cooperation of partner countries in many economic and non-economic areas. It also includes a joint solution of difficult strategic (security and defensive) issues and challenges of global governance, which have appeared as an outcome of mutual cooperation and concerns only the specific issues and problems in which both parties not only work together, but also share responsibility. Presumption of mutual cooperation between the parties, as well as common solutions to the challenges of different types, is to promote sustainable development, peace and stability, conformity in values (principles) and the strategic interests of both sides; including their common goals, commitments and procedures, all in a long-term manner of sustainability. It is a response of global powers to the increasing interdependence of the world, in which a cooperation of key partners is necessary in order to maintain their shared values and interests on a global level.

3. Conceptualization of the EU's strategic partnership and its legal bases

The unspecified nature of the EU's strategic partnership as a general category on the one hand, and the fundamental debate by institutions and EU member states on making strategic partnerships into "pivotal [tools] for addressing global challenges and safeguarding the EU's core interests and objectives – mostly security and prosperity" (Renard, 2015) on the other, inevitably leads to the negotiation of new trade, political, and security agreements with these important partners. Renard states that "Trade agreements are an integral part of the EU's grand strategy. They are not just about tariffs, nor even about jobs and investment – even though both aspects are very important. These new and ambitious trade agreements are about maintaining EU competitive in a globalised economy, about spreading European norms and standards to other parts of the world. In short, what they are about is geo-economics". Political and security agreements are conversely "about geopolitics. They set the Framework for cooperation on a number of key political and security issues, such as counter-terrorism, cyber-security or maritime security, but also climate change and development issues. They are about asserting the EU as a global actor – perhaps even power – and a global security provider" (Renard, 2015).

Since bilateral relations framework can be considered as only one aspect of the concept of strategic partnership, shaping the relationship between the EU and selected countries in the world was set as the default, and other unifying criteria should lead to the convergence of values, forms and content focus on strategic partnerships. Their application to individual bilateral partners, however, shows considerable diversity of strategic partnerships and provides an opportunity to differentiate between existing strategic partnerships and then to compare strategic partners (as displayed in Table 2).

These "unifying" criteria, which are specifically geared towards convergence, rather than divergence of the EU's strategic partnerships include:

- [1] The creation method of strategic partnership;
- [2] The type of existing bilateral contractual basis for mutual relations;
- [3] The accepted normative concept;
- [4] The area and the intensity of cooperation and
- [5] The conception of the multilateral international order.

Criteria are set by individual strategic partners inconsistently respected and thus lead to an "inconsistent" concept of the EU's strategic partnership, as will be seen from the characteristics of these criteria.

Criterion [1]: Strategic partnerships with individual countries originated from a legal point of view in different ways. Some were announced without any formal document enshrining the strategic partnership. Eventually, other countries have upgraded their relations with the EU to a strategic partnership through a formal procedure, and there is also the partnership which was announced formally in the Summit Declaration. Formal procedure was put into practice in 2003. Commission communication would propose establishing a strategic partnership, followed by its adoption by the Council of the EU and a favourable recommendation from the European Parliament. A joint summit declaration would then confirm the strategic partnership (Cirlig, 2012: 3), or (Pałasz, 2015: 5).

Criterion [2]: The frameworks for the development of bilateral relations, between the EU and strategic partners, are also diversified. The main difference lies in whether it is a political and non-contractual type of arrangement that underpins these bilateral relations (political declarations or others), or a legally binding agreement. In practice, binding agreements prevail and involve the greatest number of strategic partners to date. The agreements are of different types, ranging from the narrowest legal relationship based on association agreements through comprehensive third generation free trade agreements, all the way to the second generation agreements, which take the form of either a Partnership and Cooperation Agreements, or various types of Framework Agreements for Trade and Cooperation, some of which may include Free Trade Agreements as well. The non-contracting

arrangements, as well as some agreements, such as Join Action Plans were adopted specifically for the purposes of implementing a strategic partnership with the EU. The EU's aim is to develop strategic partnerships with each country on the basis of comprehensive regulatory frameworks by using three types of agreements: a modern trade and investment agreement (Free Trade Agreement – FTA), all-inclusive political agreements (Strategic Partnership Agreements – SPA or Framework Agreements – FA) and safety agreements that would allow the partners to participate in EU operations for crisis management (Framework Participation Agreement – FPA), (Renard, 2015).

If the strategic partnership is not apparent from the framework of bilateral relations existing between the EU and its partners, it will automatically become an instrument of “soft law”. The concept of „soft law “can be defined as: “rules of conduct which lie in a sphere which is legally non-binding (in the sense of restrictions and sanctions), but which according to the intention of their author, must be considered as being part of the legal sphere” (Sautenet, 2008: 12). Different kinds of soft law instruments used by the EU can be distinguished: unilateral global acts (communications, country strategy paper, multi-annual programs), bilateral global acts (joint declarations during the annual summits), sectoral bilateral acts (Memorandum of Understanding, sectoral agreements), and sectoral (economic) and political dialogues. In this context, the strategic partnership is apprehended as para-legal and pre-legal in its nature. A para-legal normative system has parallel status with the EU legal system. It contains standards that have no formal binding mechanism but impact specific recipients that are in a particular area. It therefore has a normative character, which relates to only specific types of action. Because it lacks (especially) the attribute of generalisation, a para-legal system is not a source of law and the norms contained therein are not legal norms. As a para-legal system, strategic partnership is important for the progress of trade and economic relations, sectoral cooperation and political dialogue. Hence, the strategic partnership is complementary to the bilateral legal framework defining the relationship between the EU and its partners. “Pre-legal” regulations mean that standards can lead to conclusions about a new, legally binding (core) agreement. Para-legal and pre-legal nature of the strategic partnership is explained in detail by Sautenet (2008: 14-58).

The institutional structure, on which the development of strategic partnerships is based, is either integrated into the foundations for the development of bilateral relations or is a part of “soft law”. It usually involves high-level summits, ministerial meetings, expert working groups, and inter-parliamentary (cooperation) committees.

Criterion [3]: Another demonstration of the EU strategic partnership as not uniformly defined, is the phenomenon of different normative concepts, according to which the partnership is established. In early December 2009 the Lisbon Treaty (the consolidated version of the Treaty on European Union, TEU, and the Treaty on the Functioning of the European Union, TFEU) came into force (Czech Government Office, 2009). Since then, the foundation for the development of relations and the creation of the EU's partnership with third countries, international, regional and global organizations are implemented in articles 21 and 22 TEU. The article 21 says: “The Union's action on the international scene shall be guided by the principles which have inspired its own creation, development and enlargement, and which it seeks to advance in the wider world: democracy, the rule of law, the universality and indivisibility of human rights and fundamental freedoms, respect for human dignity, the principles of equality and solidarity, and respect for the principles of the United Nations Charter and international law. The Union shall seek to develop relations and build partnerships with third countries, and international, regional or global organisations which share the principles referred to in the first subparagraph. It shall promote multilateral solutions to common problems, in particular in the framework of the United Nations” (Czech Government Office, 2009: 33-34). The article 22 states, that “On the basis of the principles and objectives set out in Article 21, the European Council shall identify the strategic interests and objectives of the Union” (Czech Government Office, 2009: 35). For complex partnerships, Title I, III and V TFEU are legally relevant, regulating governing the common commercial policy, development policy and humanitarian aid and international

agreements. These should also constitute an essential criterion for choosing strategic partners. Basically, this criterion requires respect for the basic values on which the EU was founded, which continuously develop and expand. To consolidate and support democracy, the rule of law, human rights and the principles of international law is one of the objectives of EU foreign policy. This so-called EU's normative objective, which is the basis of "normative convergence", in turn is the basis of converging interests and aspirations on both sides. Supporting normative objectives in relations with third countries should have become a part of the agreements with partners. Nonetheless, not all strategic partners respect this criterion. On the contrary, they underline "unconditional engagement" (Cirlić, 2012: 5) by the EU, normative diversity, equal partnership and common interests. Essentially, we can distinguish five normative concepts that are shared by the strategic partners of the EU (Cirlić, 2012: 2, 5):

- Normative convergence;
- Normative convergence, which does not always lead to a common strategy with the EU;
- Normative convergence, when, however, strategic partners interpret common values in different ways;
- Unconditional engagement, strategic partners insist on their normative concept about "common interests";
- Unconditional engagement, strategic partners insist on "enduring and mutually beneficial relations of equals".

Criterion [4]: Strategic Partnership is a tool that promotes the quantitative and qualitative development of mutual relations in many areas. The scope and depth of cooperation embodied particularly in the context of the development of bilateral relations is another criterion for differentiation among the strategic partners of the EU. Some strategic partners have achieved significant comprehensive cooperation with the EU in many areas, from trade and investment to foreign policy, crisis management, development cooperation, multilateral issues, etc. For the EU, these are "irreplaceable", or "like-minded" partners with a high degree of coordination and cooperation in a multilateral forum (Cirlić, 2012: 4). These partners therefore show a high degree of coordination and cooperation on a multilateral level, yet they appear more limited if compared to other partners. Another three groups of countries include partner states whose relations with the EU are developed by values and interest-driven and limited cooperation. Although these countries and the EU are mutually very dependent, different values and norms not only limit bilateral cooperation, but also occur in the nature of political dialogue not only about global relations and governance, but also, for example, about human rights and the existence of unresolved conflicts and disputes. In addition, countries are classified as either World Trade Organization (WTO) members under surveillance, or countries which have unresolved mutual grievances with the EU, or countries, which are markedly focusing on the development and political dialogue especially on regional issues. From this point of view, we can assign the corresponding categories: "countries with pursued WTO membership interest-driven and limited cooperation", "countries with values and interest-based, limited cooperation" and "partners with limited cooperation" (Cirlić, 2012: 4).

Criterion [5]: Strategic partnership is also a tool that enables dialogues and cooperation for the development of effective multilateralism. Effective multilateralism is defined as "a rule-based international system" (Renard, 2012: 4), or as "the development of a stronger international society, well-functioning international institutions and a rule-based international order" with the UN and the WTO at its centre. Effective multilateralism is the main objective of the EU's foreign policy, as stated in the 2003 European Security Strategy (European Council, 2003: 9-10). The EU strategic partnerships are affected by some partners with a somewhat different perception of multilateralism. Cirlić (2012: 5) states that, in principle, there are three approaches towards the conceptualization of multilateralism:

- The first is based on a commitment to global governance, based on shared rules and international law;
- The second perceive multilateralism as a means to achieve multi-polarity in the world;
- The third, as a way of supporting particular national interests; countries sharing this approach tend to interpret their national interests strictly and prefer non-binding agreements.

As mentioned above, the EU criteria for the selection of strategic partners are not entirely clear, but factors that lead to diversity of strategic partners are quite obvious. Those are: a different creation process of strategic partnership, a different framework for bilateral relations, and diversity of generally accepted values (principles) hence, different normative concepts, different scope and intensity of cooperation and a different approach to multilateralism. As a result, partners are quite different within the classification of strategic partners.

Given criteria and EU approaches towards partner countries are summarized in Table 1.

4. Differentiation of EU's strategic partners

All the strategic partners of the EU have one thing in common: an economic as well as a political influence in regional and/or international issues. All the strategic partners of the EU are either major world economic players or countries with a high rate of economic growth and have great political ambitions. These countries are either able to directly affect the prosperity and security of the EU, with the EU being significantly interrelated and playing a central role in global governance (USA, Russia, China) or have the potential to influence the EU in the same way as its economic power grows along with their growing political importance (Brazil, India, South Africa). All strategic partners are aiming to become members of the former G8 + 5 (USA, Japan, Canada, Germany, Great Britain, France, Italy, Russia – Russia was a member of the G8 until 24. 4. 2014 / Brazil, China, India, Mexico, South Africa), or are the members of G20 (a group of the largest economies in the world, represented by finance ministers and central bank governors of 19 countries and the EU, that assume the role of chief coordinator of the global economy rather than the G8). For the EU, strategic partnerships should, therefore, fulfil a reflexive function, for instance, to promote the international position of the EU.

On the basis of the criteria set out in Table 1, it is possible to evaluate the different features of EU's individual strategic partners. Table 2 shows that, as far as the establishment of strategic partnerships with individual countries is concerned, the US, Japan, Canada and Russia were proclaimed partners without any formal document that enshrines the strategic partnership. In the case of China, India, South Africa, Brazil and Mexico strategic partnerships were established through a formal procedure, consecutively in 2003, 2004, 2006, 2007 and 2008. The strategic partnership with South Korea was formally announced at the EU-South Korea Summit Declaration in 2010.

Regarding the framework for the development of EU bilateral relations and strategic partners, the two countries (the US and Japan) formed a partnership based on non-contractual arrangements, specifically on the basis of political non-contractual acts – New Transatlantic Agenda (the US) a Joint Political Declaration (Japan) and additionally the Joint Action Plans. In relation to the USA Urszula Pałasz noted that “with the US, the EU has its densest legal and practical network” (Pałasz, 2015: 5), despite the fact that so far there is no relationship in the framework agreement. Terms are negotiated with difficulty in the form of Transatlantic Trade and Investment Partnership Agreement, TTIP (negotiations on TTIP was launched in July 2013 and in October 2016 already took place on the 15th rounds; TTIP advisory group last meeting was held 9. 3. 2017; negotiations were halted by President Donald Trump, who then initiated a trade conflict with the EU). The negotiation of two agreements – the Strategic Partnership Agreement (EPA) and the Free Trade Agreement (FTA) – started in 2013, and both agreements were signed on 17 July 2018 and entered into force on 1 February 2019. With the other countries, strategic partnerships are on contractual bases. Specifically, these include the association agreement Economic Partnership, Political Coordination and Cooperation Agreement (Global Agreement) in the case of Mexico, which came into force in 2000. On 25th May 2016 the EU and Mexico launched the negotiations to modernize the Global Agreement. It is also the Framework Agreement for Commercial and Economic Cooperation between the European Communities and Canada of 1976; in October 2016 not only a comprehensive FTA third generation – Comprehensive Economic and Trade Agreement (CETA), but also the Strategic Partnership Agreement (to replace the original agreement) were signed between the two parties. The only country that has signed all three

agreements with the EU, thus representing the “ideal-type” of a framework for strategic partnerships, is South Korea. The EU-South Korea FTA, together with Framework Agreement, were signed in 2010 and came into force on December 13, 2015. Framework Participation Agreement, a security agreement – the first one with a strategic partner – was signed by the two parties in the second half of 2014 and is waiting for ratification. Second generation agreements, which have the form of Partnership and Cooperation Agreements (PCA), are the basis for strategic partnership with Russia, and those gaining different types of Framework Agreements for Trade and Cooperation, some of which may include the FTA, are the basis for partnerships with Brazil, China, India and South Africa.

Table 1. Criteria for the concept of bilateral EU strategic partnership and variations of possible approaches from partners

Criterion 1	Criterion 2	Criterion 3	Criterion 4	Criterion 5
Formation of strategic partnerships	Bilateral relations framework	Accepted normative concept	Areas of cooperation	Multilateralism understanding
No formal procedure	Political non-contractual acts	Normative convergence	Irreplaceable partners with all-inclusive cooperation	Commitment to global governance, based on shared rules and international law
Formal procedure	Association agreements	Normative convergence – no common strategy	Like-minded partners with all-inclusive cooperation	Means to achieve multi-polarity
Formally announced in summit	Free Trade Agreements – 3 rd generation	Normative convergence – different readings of common values	Like-minded partners with high degree of coordination and cooperation in multilateral fora	Way to support specific national interests
	Various agreements – 2 nd generation	Unconditional engagement – common interest	Countries with pursued WTO membership, interest-driven and limited cooperation	
		Unconditional engagement –enduring and mutually beneficial relations of equals	Countries with values and interest-based, limited cooperation	
			Partners with limited cooperation	

Source: Author’s construction based on Cirlig (2012) a Renard (2012).

Strategic partnership with Russia began to be established in May 2003, on the basis of PCA, which was signed in 1993 and come into force in 1997 for a period of ten years (until 2007) and the Road Maps for the Common Spaces, adopted in May 2005. PCA is a legal act that regulates a wide range of policy areas, including economic and political problems. The Road Maps are soft law acts that contain a number of short- and medium-term instruments for the implementation of the four Common Spaces: the Common Economic Space; the Common Space on Freedom, Security, and Justice; the Common Space on External Security; and the Common Space on Research, Education, and Culture. In 2008 it was decided to negotiate a new framework agreement, although in 2014 negotiations were suspended in connection with the Ukrainian crisis. Despite the resolution of the plenary session of the European Parliament in June 2015, prompting further not to treat Russia as a strategic partner, we believe that the EU and Russia are each other’s so important partners so that severing relations goes against the logic of the development of the contemporary world. V. Voynikov and I. Kant argue: “The disputes over the Ukraine crisis prevent the realization of common projects within the EU-Russia Strategic Partnership, which are subjects of common interest. On the other hand, the EU and Russia are not ready to give up their strategic partnership. That is why, from the EU side, EU-Russia cooperation could be defined as a ‘frozen Strategic

Partnership” (Voynikov – Kant, 2015: 21). To some extent, negotiations of the comprehensive PCA with China are frozen as well.

With regards to the accepted normative concept, USA, as well as South Korea, respect the same fundamental values of the EU, and thus share the concept of “normative convergence” (consensus on values and interests). Moreover, normative convergence is also accepted by Japan and Canada. Nevertheless, a common normative concept does not necessarily lead to common strategies. Mexico, Brazil, India and South Africa also operate on the basis of normative convergence; however they often interpret common values in different ways. Russia bases its normative concept on “common interests”, China on “enduring and mutually beneficial relationship of equals” and both partners emphasise “unconditional engagement” by the EU (for more details see Cirlig, 2012: 5-6).

In case of cooperation, we can say that the new agreements between the EU and its strategic partners will deepen and broaden the scope of bilateral cooperation on a wide range of issues, such as international peace and security, counter-terrorism, human rights and nuclear non-proliferation, clean energy and climate change, migration and peaceful pluralism, sustainable development, and innovation. For example, the CETA and the SPA will take Canada-EU relations to a new level of intensified and structured engagement. Also, the “EU-China Strategic Agenda for Cooperation”, adopted in 2013, became the basis for cooperation in security and defensive matters. The EU has delineated the following groups of strategic partners, according to the degree of coordination and cooperation at the multilateral level (Cirlig, 2012: 4):

- “irreplaceable partners with all-inclusive cooperation, aimed at promoting global peace and stability, development and multilateralism to address global challenges” (USA),
- “like-minded partners with all-inclusive cooperation” (Canada),
- “like-minded partners with high degree of coordination and cooperation in multilateral for a” (Japan, South Korea, Mexico),
- “countries with pursued WTO, interest-driven and limited cooperation” (Russia and China), [about “how China’s commitments in the WTO influenced China’s merchandise trade in period of 2001-2010 and what impact it had on the European Union”, see paper by Lenka Fojtíková (2012: 56-65)],
- “countries with values and interest-based, limited cooperation” (Brazil, India),
- “partners with limited cooperation” (South Africa).

The countries that are developing interest-based cooperation with the EU, are often situated in opposing allies to the EU, particularly within BRICS, or BASIC format (BRICS without Russia), or IBSA dialogue forum (India, Brazil, South Africa), but also in international forums on trade, climate, global economic governance.

According to how strategic partners perceive multilateralism, the group of countries which are based on a commitment to global governance, based on shared rules and international law, include USA, Canada, Japan, Mexico and South Korea. Among the countries that perceive multilateralism as a means to achieve multi-polarity in the world are China, Russia and, increasingly, South Africa and Brazil. The final group consists of India, which conceives multilateralism as a way of fostering particular national interests. Countries that are sharing this way of understanding multilateralism, tend to interpret strictly their national interests and prefer non-binding agreements (sometimes this approach is also preferred by the USA). These different approaches often represent challenges for the EU, especially when dealing with a number of global issues. For instance, climate change, where the EU has faced different opinions from the BASIC group, and the US enforcement regardless of the EU’s decision; discussions on generic drugs or liberalization of agricultural products, where IBSA group has presented different opinions than those of the EU, USA and Japan. Furthermore, there was the question of the reform of the International Monetary Fund, where the EU stands in opposition to the BRICS, which in turn is supported by the US; moreover, strategic partners voting preferences in the United Nations are often different from the position of the EU. In 2004-2009, the least coherence with the EU vote was expressed by the following countries: the USA,

China and India, and the highest voting cohesion was recorded in the case of Canada, Japan and South Korea. The different normative concepts professed by various partners are reflected in votes on specific global issues. For example, EU's opinion that advocates humanitarian interventions, is opposed by the countries that support the principle of state sovereignty and non-interference (Cirigli, 2012: 5).

The comparison of approaches by the EU's strategic partners according to individual criteria is summarized in Table 2.

Although the EU is developing a similar cooperation with all its strategic partners and partnerships are expanding both in terms of horizontal, multilateral and global politics, the implemented policies, the status of global actors, and the nature of the strategic partnership with the EU varies widely. Hence, the formation of a strategic partnership is sometimes derived not from the criteria of the concept of strategic partnership between the EU, but from "the capacity of the country to exert a significant influence on global issues" instead, such as Mexico (European Commission, 2008). As a consequence, ambiguity or inconsistency emerges in the concept of the EU strategic partnerships. The actual non-existence of the uniform concept of the EU strategic partnership leads to the fact that some authors question the effectiveness of the EU in promoting its values towards third partners and propose to distinguish between democratic and non-democratic partners and adapt it to particular partnerships. Other authors, taking into account Articles 21 and 22 of the Treaty of Lisbon, as well as the differentiation of partners according to other criteria on which some authors questioned some of the existing strategic partnership (see eg. Maher, 2016). EU itself classified its partners as:

- the essential (the US);
- the pivotal – crucial at global level (Russia, China, Brazil, India);
- the natural allies – like-minded countries and traditional allies (Canada, Japan, South Korea)
- and regional partners – potential leaders in Their regions (Mexico and South Africa) (Cirigli, 2012: 3).

This affects the strategy that the EU uses to approach these partners.

After the Lisbon Treaty came into force, the European Council decided on the processing of internal periodic progress reports with the intent to monitor and evaluate existing strategic partnerships, including frequency, as well as forms and outcomes of summits. The first Progress Report was issued in December 2010 (Strategic Partners Progress Report for the European Council, 2010) having discussed the US, China and Russia (the three partnerships with the highest priority), and in 2011 – India, Brazil and South Africa (European Parliament, 2012). Reports monitored both common elements in all partnerships and at the same time focused on the specific characteristics of each partner. These reports have demonstrated the limitations of identified goals, common interests and priorities in each of the respective partnerships. Nonetheless, these reports confirmed that one of the fundamental goals of the strategic partnership is to coordinate a process between the EU and its partners to promote effective multilateralism in the world, including international organizations. Progress Reports, however, not only brought to light open questions related to the content of partnerships, such as regarding the EU strategy towards its partners and coordination of their relations, but also questions of technical nature – what is the mission of such reports, and whether it is appropriate for a single assessment document using a unified method to encompass the integration into the global foreign policy strategy (broader strategic framework) (Cirigli, 2012: 1), (Renard 2012: 2).

Table 2. Comparison of the strategic partners of the European Union by selected criteria

Partner	Formation of strategic partnerships	Bilateral relations framework	Accepted normative concept	Areas of cooperation	Multilateralism understanding
USA	No formal document	Political non-contractual acts	Normative convergence	Irreplaceable partner with all-inclusive cooperation	Commitment to global governance, based on shared rules and international law
Canada	No formal document	Framework Agreement for Commercial and Economic Cooperation	Normative convergence – without common strategy	Like-minded partner with all-inclusive cooperation	Commitment to global governance, based on shared rules and international law
Japan	No formal document	Political non-contractual acts	Normative convergence – without common strategy	Like-minded partner with high degree of coordination and cooperation in multilateral fora	Commitment to global governance, based on shared rules and international law
Russia	No formal document	Partnership and Cooperation Agreement	Unconditional engagement – common interest	Country with pursued WTO membership, interest-driven and limited cooperation	Means to achieve multi-polarity
South Korea	Formally announced in summit (2010)	Framework Agreement and Free Trade Agreement	Normative convergence	Like-minded partner with high degree of coordination and cooperation in multilateral fora	Commitment to global governance, based on shared rules and international law
China	Formal procedure (2003)	Agreement on Trade and Economic Cooperation	Unconditional engagement – enduring and mutually beneficial relations of equals	Country with pursued WTO membership, interest-driven and limited cooperation	Means to achieve multi-polarity
India	Formal procedure (2004)	Cooperation agreement on partnership and development	Normative convergence – different readings of common values	Country with values and interest-based, limited cooperation	Way to support specific national interests
Brazil	Formal procedure (2007)	Framework Agreement for Cooperation	Normative convergence – different readings of common values	Countries with values and interest-based, limited cooperation	Means to achieve multi-polarity (ambivalent approach)
Mexico	Formal procedure (2008)	Economic Partnership, Political Coordination and Cooperation Agreement	Normative convergence – different readings of common values	Like-minded partner with high degree of coordination and cooperation in multilateral fora	Commitment to global governance, based on shared rules and international law
South Africa	Formal procedure (2006)	Agreement on Trade, Development and Cooperation	Normative convergence – different readings of common values	Partner with limited cooperation	Means to achieve multi-polarity (ambivalent approach)

Source: Author's construction based on Cirlig (2012) and Renard (2012).

Conclusion

From the works of various authors above, especially Thomas Renard (2012: 3-5), we can see that in the future it will be necessary for the EU and its Member States to act more strategically. Moreover, it will be increasingly important for them to clearly formulate goals, strategic interests, and direct their resources and financial instruments to realisation. This fact was confirmed in 2010 by President of the European Council, Herman Van Rompuy, when he said “We have strategic partners, now we need a strategy” (Van Rompuy, 2010). From this perspective, it is necessary to create strategic partnerships as a part of a broader strategic base, enhance coordination not only between the EU and the Member States but also between the EU institutions, and effectively use the summits for the integration of all relevant instruments and policies. Strategic partnerships should be gradually integrated into various regional and thematic strategies. For example, a strategy for Asia, Central Asia, Africa, energy security, weapons of mass destruction should take into account the role of strategic partners and cooperation with them. In other words, regional and thematic strategies should be firmly anchored in strategic partnerships. Creation of a broader strategic framework should be based on existing documents and agreements and harmonize all dimensions of security in a coherent framework which should take into account the role and the potential of the strategic partnerships.

Strengthening the coordination between the EU and Member States should be ensured by the uniform access of Europeans on key issues of international agenda, especially those that fall under shared competencies and in cases of exclusive competence of the EU. Some Member States have negotiated with third countries (USA, China) their own bilateral partnerships (for instance the latest case- Czech Republic and China). If so, these relationships should not compete with partnerships at the EU level or undermine efforts to deal with strategic issues. Strengthening coordination is also expected between the EU institutions. Institution that coordinate the EU's external action is the European *External Action Service (EEAS)*. The EEAS should take responsibility for coordinating all EU policies with respect to strategic partners and to encourage the role of EU delegations. Summits should, among other things, be helpful in supporting of negotiations unblocking on certain issues. Summits with strategic partners should not only be challenging to organize, but also will ensure delivering adequate results. It is important, that these are strategic summits which will lead to a better agreement on the diplomatic level and will create a broader concept of strategic partnership.

If the EU is to increase its international influence in the world and become a global player, it must actively approach establishing a multilateral order. For this purpose, in particular the strategic partnerships should serve as a means through which it is possible to achieve “variable geometry” agreements and strengthen the multilateral system. Partnership is a way to promote convergence and to reduce divergence of partner's approaches in a given context. Various political and sectoral dialogues can help to create new coalitions and agreements. Multi-polarism would weaken the influence of the EU, which currently does not have a common foreign policy and, moreover, as an “individual” partner have no experience in real politics.

In its external relations, the EU, with regard to its identity, has always supported regional integration and inter-regionalism and has led by example to the number of integration groupings, especially in Africa and Latin America. Renard, however points out that bilateralism in term of strengthening strategic partners vis-a-vis other countries may change regional dynamics with consequences for integration and the growing international role of the EU might weaken its influence in regional organizations. For countries like Brazil, India and South Africa, it is unthinkable to renounce, in the newly acquired global influence, their power in regional clusters. The EU will therefore have to rethink its regional approach and transform it into a complementary approach towards multilateralism (Renard, 2012: 4).

As far as strategic partners are involved, the EU should strengthen and deepen these strategic partnerships in the future. These partners have been selected, however, as seen above, rather randomly, as opposed to being based on

strategic considerations. Therefore, the number, or the list of partners, may not be final. Already in 2008, the revised European Security Strategy (European Council, 2009) recommended as key partners countries such as Norway and Switzerland (and a number of regional organizations). Renard considered Turkey as a possible strategic partner, especially in the context of the current immigration crisis in the EU, which has growing strategic interests, but is also an aspiring candidate for EU membership (Renard, 2012: 6). EU's strategic partnerships are therefore informal and flexible categories, rather than definitive and permanent list.

Finally, we note that the EU should aim for the effective and genuine strategic partnership. Such partnership should be comprehensive, empathetic (understanding of mutual values and interests), built on reciprocity, long-term oriented strategic issues in which the partners have common interests, promote multilateralism and cooperation in the region, and be integrated into a broader strategy of the EU. In the future, we can therefore expect, as mentioned by Cirlig, two scenarios – first, the deepening of partnerships with fewer highly prioritized countries or, second, expanding a partnership with a bigger circle of countries and framework policies in place (Cirlig, 2012: 7). Taking into account our findings, we argue for the second scenario.

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Prof. Ing. **Eva CIHELKOVÁ**, CSc. in World Economics, obtained at University of Economics, Prague, guarantor of study programs, academic researcher, Faculty of Economics and Business, Pan-European University in Bratislava (PEVŠ), Slovakia.

ORCID ID: orcid.org/0000-0002-7428-1584

MSc. **Hung Phuoc NGUYEN**, PhD. in Economics and Management of International Business, obtained at Pan-European University, Bratislava, lecturer at the School of Economics and Management in Public Administration in Bratislava (VSEMvs), Slovakia.

ORCID ID: orcid.org/0000-0002-4528-9827

Ing. **Michal FABUS** PhD. in International Economics Relations, obtained at University of Economics in Bratislava, Vice-rector for Foreign Affairs, Head of Department of Economics and Finance, School of Economics and Management in Public Administration in Bratislava (VSEMvs), Slovakia.

ORCID ID: orcid.org/0000-0002-3792-179X

Kristina Cimova MA MSc, is PhD candidate in Central East European Studies, School of Social and Political Sciences, University of Glasgow, United Kingdom.

ORCID ID: orcid.org/0000-0001-7747-9230

Register for an ORCID ID:

<https://orcid.org/register>

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TEMPORARY FACTORS THAT CONDITION INNOVATION: COMPARISON BETWEEN FAMILY AND NON-FAMILY BUSINESSES

Pedro Núñez-Cacho ¹, Daniel Lorenzo ²

¹University of Jaén, Campus Las Lagunillas, s/n, 23071, Jaén, Spain

²University of Cádiz, Avenida Enrique Villegas Vélez, nº 2 11002, Cádiz, Spain

E-mails: ¹pnunez@ujaen.es; ²daniel.lorenzo@uca.es

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Abstract. Studies conducted on innovation in family businesses have offered very diverse and sometimes contradictory results. The objective of this paper is to analyze the influence of time-related variables on the innovative behavior of companies. Furthermore, we compare the behavior of family and non-family companies, the influence of the generation and the transference of management. To do this, companies are classified according to the stage of life in which they are and are compared using a mean difference test (Anova). Subsequently, already focused on family businesses, the effects of generating control in the case of family businesses are analyzed, considering the foundational and subsequent periods. The results show that the behavior towards the innovation of family businesses is conditioned by the temporal dimension.

Keywords: innovation; time; family businesses; entrepreneurship

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1. Introduction

The family-owned nature of the firm influences the processes of innovation (De Massis, Frattini and Lichtenthaler, 2013). Regarding the innovative orientation of family firms, there are two different streams in the literature. On one hand, family firms are developed from the entrepreneurial spirit of the founder, trying to maintain this entrepreneurial impulse across generations (Casillas, Moreno, and Barbero, 2011; Eddleston, Kellermanns, and Zellweger, 2012; Zellweger, Nason, and Nordqvist, 2012). On the other hand, some authors argue that family firms are not willing to afford risks and become more conservative along the time (Naldi *et al.*, 2007; Zahra, 2005). De Massis, Kotlar, Chua and Chrisman (2014) point that there is no clear evidence about the innovative behavior of family firms. Previous research offers mixed results that can be explained by measurement

factors (Rutherford, Kuratko and Holt, 2008), or by means of missing mediators or moderators behavior (De Massis, Chirico, Kotlar and Naldi, 2014).

Proactiveness is an important feature of family firms' innovative behavior, as well as a key source of sustained growth and performance for family firms (Casillas, Moreno and Barbero, 2010). Entrepreneurial spirit within family businesses may be crucial because its main goal is to identify and gain opportunities, in the dynamic and uncertain competitive environment (Sirmon and Hitt, 2003). Family firms have to face the challenge of surviving in the long run while, maintaining their distinctive features and the innovation can be a way to achieve the goals of family firms. According to Aronoff (1998) family businesses, which feature a long tradition of entrepreneurship, have an advantage in the transition over time.

Innovation is constantly improving: new techniques and methods appear and every day more qualified personnel involved. Innovation processes can start with the recognition of entrepreneurial opportunities, followed by the entrepreneurial actions of exploration and exploitation of the entrepreneurial opportunity. Following Goel and Jones (2016) the firm can opt for two actions, or a combination of them –ambidexterity–, to deal with entrepreneurial opportunities. Ambidexterity changes over time in family firms, so it is so important to consider the temporal dimension in the research of family firms (Sharma, Salvato, and Reay, 2014).

According to Zellweger and Sieger (2012), the proactive attitude of family firms may change over time, so it can be expected differences in the innovative behavior in family firms over time. But, how about non-family firms? Can be expected differences in the innovative behavior among family firms and non-family firms over time? Do they evolve following different paths over time? Maybe age of the firm the main a determinant factor of the evolution of its innovative behavior? Are other factors such as sustainability the reasons of this behavior, or it could be determined by their family or non-family nature? We try to shed some light about these research questions in our study.

The above arguments show a relevant aspect, which presents a lack of research about it. Despite some previous works (Zellweger and Sieger, 2012; De Massis et al. 2014a), the temporary dimension and its influence on the innovate behaviour in family firms is a topic that remains understudied. Therefore the aim of this paper is to analyze the effect of time on the innovation behaviour of the business, and the study of the different effects of it on family firms and non-family firms. To do so, we focus on the different stages of firms, distinguishing between first and later generations of family firms, so considering a temporal distinction for non-family firms. This is useful for the study of family companies, as stated Rau, Werner & Schell, 2018. In addition, the effects on the innovative behavior of companies both of age and of generation in control are analyzed. It contributes to the development of knowledge about family businesses (Núñez-Cacho & Grande, 2013, 2012)

After this first introductory section, the theoretical framework and hypothesis are addressed. Then, the methodology used and the results of the study are presented, and it ends with the discussion and conclusions.

2. Theoretical framework and hypotheses

2.1 Innovation and family businesses

In order to address the research questions about the influence of time on the innovative behavior of the firms, we draw on both agency theory and stewardship theory. According to De Massis et al. (2014a), innovative behavior in family firms can be explained from both an agency and stewardship perspectives. Previous works have focused on the overlapping field that is common to entrepreneurship and family business (Habbershon and Pistrui, 2002; Aldrich and Cliff, 2003; Rogoff, Kay and Heck, 2003; Anderson, Jack and Dodd, 2005; Nordqvist and Melin, 2010) to analyse the entrepreneurial features of family firms that can foster the innovation (Lorenzo and Núñez-Cacho, 2012).

In addition, Corbetta and Salvato (2004) suggested that the innovative behavior depends on the agency-oriented or the stewardship-oriented behaviors between family members and firm managers and owners, that in turn, depends on the nature of family dynamics. These behaviors can evolve over time, from a more stewardship-oriented trend at the early stages of development of the firm, to a more agency orientation in the following stages of life cycle (De Massis, et al. 2014a). The study of the family business has been supported by very diverse theories, which have generally been "borrowed and not returned" to other sister disciplines. Therefore, as we have seen in previous sections, when we reflect on the theoretical framework for the study of family businesses, we find a broad group of theories, many of them complementary to each other (agency-stewardship; agency-resources and capabilities; resources and capabilities-systems etc.) and mostly from the field of organization, psychology, economics and law. Besides, an experience such as succession in the company is rooted in the company's culture (Rau et al. 2018) can condition innovation. Stewardship theory approaches can improve innovation in family businesses and not in family businesses (Neubaum, Thomas, Dibrell and Craig, 2017).

The literature of family businesses takes into consideration two different perspectives (Casillas et al., 2011; Chirico, Sirmon, Sciascia and Mazzola, 2011). On one hand, some authors suggest that family firms feature unique conditions to develop an entrepreneurial path (Núñez-Cacho et al. 2018). On the other hand, other papers point to a more conservative and risk averse profile of family firms (Zahra, 2005; Naldi, Nordqvist, Sjöberg and Wiklund, 2007). There are mixed results about the entrepreneurial or conservative nature of family firms, remaining unanswered the question about the real orientation of family firms towards innovation. Chirico et al. (2011) suggest that it is possible that neither of these two perspectives is fully correct. Perhaps it can be owed to the multiple differences among family firms in terms of openness to change, degree of generational involvement and participation of family members or family employees in the formulation of the strategy. Therefore, the research on innovation in family businesses is inconclusive, although of crucial relevance because of the strong influence of innovation on the firm's performance, growth, and survival (Beck et al., 2011).

2.2 Time and Innovation

Within this research domain, entrepreneurial orientation (EO) has become a well-established construct (Nordqvist and Melin, 2010; Zellweger and Sieger, 2012). EO is referred to "the need for organisations to develop and orientation that allows their individuals and teams to engage in entrepreneurial strategy making" (Nordqvist and Melin, 2010; p. 226), explained by Chirico et al. (2011) as the tendency toward product innovation, proactiveness and risk-taking behaviors.

There are considerations of the time and innovation in the family firms proposed in the literature. Thus, regarding the models that proposed that the family effect has a dual effect that is different for input versus output (Matzler et al., 2015; Lichtenthaler and Muethel, 2012), we could observe the temporality in these kind of studies, they analyse firstly input (initial stage) and after output (final stage). Besides, the models of Duran, Kammerlander, van Essen and Zellweger (2014) and Cucculelli, Le Breton-Miller and Miller (2016) explained that the different behaviour of family firms on innovation was caused by a temporary aspect: The generation in charge. On the other hand, König, et al. (2013) stated that family influence is related with the speed of discontinuous technology adoption that is an accumulated function conditioned by three aspects. Firstly, by the time that incumbents take to recognize the innovation as a relevant strategic issue that requires a response (Kaplan et al., 2003), secondly by the time that incumbents decide to adopt the discontinuous technology (Christensen, 1997), and thirdly by the time that incumbents implement the adoption decision by launching a first product based on the new technology (Lieberman & Montgomery, 1988). Because the respective duration of each of these three adoption phases (Thomas et al., 1993) is not equally affected by each adoption barrier, we discuss the impact of family influence on each of the phases separately. Finally, Carnes et al. (2017) also explain the importance effect of time, highlighting that to innovate is a challenging yet necessary activity for firms throughout their life-cycle to maintain growth over time (Hess, 2007; Hitt et al., 2006).

The EO can be stated to capture a firm's entrepreneurial behavior through innovation, proactivity and risk-taking (Basco et al. 2019). Product innovation refers to the launching of new products to attend the needs of current or future costumers, by using creativity; proactiveness is related to with anticipation in the markets; and risk-taking behavior reflects an entrepreneurial orientation facing decisions that involve a relevant bet for the firm. These three original dimensions of EO have been extended by Lumpkin and Dess (1996), who added autonomy and competitive aggressiveness. Autonomy concerns to the independent action of an individual or a team in bringing forth an idea or a vision and carrying it through to completion (Lumpkin and Dess, 1996), whereas competitive aggressiveness is referred to a firm's propensity to challenge its competitors (Lumpkin and Dess, 1996; Zellweger and Sieger, 2012). De Massis, Chirico, Kotlar and Naldi (2014) focus on proactiveness, as a relevant trait of entrepreneurial behavior in family firms and a crucial source for growth (Casillas, et al., 2010), to analyze its relationship with firm age. They conclude that proactiveness in family firms first declines, then increases, and finally decreases over time.

The time has been considered in studies of FBs analyzing the generation in control, this is the generation that has the control over the management of the family firm (Bammens, Voordeckers, & Van Gils, 2008; Cruz & Nordqvist, 2010). Beck et al. (2011) analyzed the influence of the generation in control on innovation in family firms, previously studied also by Litz & Kleysen (2001), Lorenzo-Gómez & Núñez-Cacho, (2012) and Zahra (2005) and conclude that this relationship is mediated by market orientation. Therefore, the role of the generation in control need to be taken into consideration, because introduces heterogeneity into family firms (Kellermanns & Eddleston, 2006; Kellermanns et al., 2008). This heterogeneity is derived from the evolving features of the family firm's management and structure as the company passes on from one generation to the next (Lansberg, 1999).

Regarding to the differences between family firms of first-generation and later-generation, they were previously studied by Rau et al. (2018). These authors highlighted that the differences between generations include features such as decision-making structure, professionalization degree, attitude against risk, external orientation and orientation towards growth (Beck et al., 2011). The decision-making processes are dependent on the dispersion extent of managerial control among family members (De Massis et al., 2014a). The decision-making structure is more centralized and the level of professionalization is usually lower in first-generation family firms rather than later-generation family firms, as a consequence of the strong influence of the founder in the early periods of the company (Cruz & Nordqvist, 2010; Dyer, 1988). Besides, Zahra, Hayton and Salvato (2004) analyzed risk aversion in family firms, concluding that later generation family firms are more averse to risk than first generation family firms. In addition of it, later generation family firms present a more external orientation than early step family firms that are more internally focused (Cruz & Nordqvist, 2007). Finally, later-generation family firms are more oriented to growth (Kellermanns & Eddleston, 2006), because of the need for growth to ensure the survival of the firm (McConaughy and Philips, 1999). Thus, family firms need to maintain and enhance their innovation capabilities in order to ensure the trans-generational survival of the firm (Beck et al., 2011).

Other justification to these differences in the research is highlighted by Duran et al. (2016) stated that the difference on results on innovation output in family firms with later generation as opposed to first-generation CEOs, arguing that those dynamic capabilities cannot be acquired at short-term, because they need to be built up over an extended period of time. So, innovation processes are conditioned by the time, because it is the only way to acquire dynamic capabilities (Teece, Pisano and Shuen, 1997). As such, the authors also draw attention to the temporal perspective of firms' competitive advantages with regard to innovation, which might cumulate over time.

In addition to this, Werner, Schröder and Chlosta (2017) argue that the companies are conditioned by the time that they spend in the integration in the environment (Aldrich and Cliff, 2003; Bird and Wennberg, 2014). The enduring occupation of the family owner leads to networks of trust with clients and suppliers as potential partners

in R & D cooperation (Habbershon and Williams, 1999). Trusted cooperation along the value chain illustrates the strong networks of SMEs, specifically traditional and old family businesses (Llach and Nordqvist, 2010).

Following Schumpeter (1934), it could be said that innovation is influenced by the way in which a firm manages its resources over time and develops its capabilities. In family firms, the management and structure of the firm of resources and capabilities is performed by the generation in control (Lansberg, 1999), that in turn influences on the innovation of the firm (Beck et al., 2011).

Hypotheses

The specific characteristics of family businesses can contribute to the maintenance of their entrepreneurial orientation over time. Thus, Zahra (2005) points that family firms present a more innovation-oriented culture when the later generations are involved at the helm of the firm. If we consider that family businesses management is transferred from generation to generation, by means of renewal processes that imply a broad tenure which can be extended for a generation -about 25-30 years-, family businesses can respond in a better way to the challenge of reinventing themselves that companies which just have to face this matter from time to time. The replacement of a person in charge of the family business management, which is usually at the end of his professional life, by a person of the next generation, implies a renewal in the direction, changing an elder person for someone younger, with most of his/her professional life ahead. Next generations are often characterized as the drivers behind innovation as well as the identifiers of entrepreneurial opportunities, in searching of new ways of doing things (Beck et al., 2011). The lower demand for results of the family business, characterized by shareholders committed to the long term, what has been called patient capital, facilitates this process of transition between generations, and allows new family members in charge to develop their own way of managing, and at the same time the renewal of the business model and keeping the company in the hands of the family. Because of the changing environmental conditions, next generations have to develop a more external orientation (Cruz & Nordqvist, 2010). Other example is Rau et al (2018), highlighting that with a growing number of generation, innovation output in family firms continuously decrease.

It could be asked if can be expected differences between generations in terms of attitude towards innovation. The founder, in the first generation, is an entrepreneur who sets up a business idea that over time and with his effort can lead to the consolidation of his/her company. In this early step, the concentrated decision-making authority of the founder (Dyer, 1988), may lead to a negative influence on innovation (Beck et al., 2011).

The next generation can inherit a consolidated company, with a business model that has worked properly during a long period, which could coincide with the founder's tenure. However, after a few years, the initial idea will need a renewal to maintain the competitive pulse of the company. On the other hand, the next generation does not have to be a clone of the founder and possibly have their own ideas to reorient the business model of the company. The participative involvement of family members in decision making, in the second or upper generation family firm facilitates innovation (Aronoff, 1998). In addition, the succeeding generations usually receive a higher level of education compared to their predecessors. This greater and better training, regarding to not only the academic field, but also the external work experience in other companies, that they have received as part of the training of successors, could provide the necessary ideas for the renewal of the business model. Also, second or more generation family firms tend to be more professionalized than first-generation family firms (Dyer, 1988).

The sharing of decision making, the higher degree of professionalization, and the higher level of training lead to a higher level of innovation in later-generation family firms. Beck et al. (2011; 256) indicate that “later-generation family firms must rejuvenate, recreate, and reinvent themselves if they want to sustain the same level of growth and financial inheritance of the previous generation”. In a similar way, Kellermanns et al. (2008) highlight the

priority on business growth that later-generation family firms must foster in order to ensure the survival of the firm. As a consequence, growth and survival are crucial goals for family firms as a means to allow the transition to the next generations (Kellermanns et al., 2008; Beck et al., 2011) that lead to the reinforcement of innovation.

In this sense, it could be considered that family businesses feature a greater innovative character, both in their beginnings, which can be comparatively similar to those of non-family companies, and in the continuity over the succeeding generations. The need for innovation can be favored by the renewal of leaders at the head of the company, that come from a different generation, by replacing older people with younger people, which may hold better training. One might wonder whether differences in the innovative nature of the company in different generations should be expected. So that, is the family business in the first generation more innovative by the creative impulse of the founder? Or, on the contrary, is it more innovative in the following generations, thanks to the renewing impulse provided by the successors? And if so, could it be considered more innovative the family businesses than non-family ones, which go through renovation processes in a different direction and ownership?

Relief in the management of non-family companies occurs more frequently than in the case of family businesses, whose tenures tend to be more extended over time. That is, family managers may have more possibilities to develop their ideas, more time and a more appropriate context to implement them, because of the family support and non-dependence on short-term results. Possibly managers of non-family companies are more afraid of risking their managerial position by experimenting new business options. This situation may be repeated over time, since the demand for short-term results may not allow to set long-term stable objectives, and ultimately the renewal of the business model on a basis strong enough to build competitive advantages in the long term. In addition of it, the passage of time puts at risk the survival of the company, which will only succeed if it is able to renew itself and maintain its competitive capacity over time (Beck et al., 2011). In this way, it can be considered that seniority influences its innovative capacity, so we can expect differences between younger and longer-lived companies in this regard.

Family firm, due to a mix of long-term orientation, unique resources and capabilities through the interaction of family and business systems makes their behavior different from that of a non-family business throughout their product / market cycle life (Sharma and Salvato, 2011). Patel and Fiet (2011) point that family firms can take advantage of the accumulation of knowledge assets and networks along their trajectories, in order to discovering and exploiting business opportunities. They argue that this kind of family specific resources allow family firms to develop incremental innovations in a more efficient way than non-family firms (Rojas et al. 2017). As a consequence, we propose the next hypothesis:

H₁: In a static temporal analysis, family businesses are more innovation-oriented than non-family businesses

H_{1a}: Family businesses in their first stage of life (0 to 30 years) are more innovative than non-family businesses

H_{1b}: Family businesses in their second stage of life (30 to 60) are more innovative than non-family businesses

Family businesses could be expected to benefit from their specific characteristics over time, and therefore it can be formulated that older family businesses can be more innovative, by transmitting the generational legacy in terms of experience and knowledge. In this sense, this influence of the time factor could be more prominent in the case of family businesses, in comparison with non-family businesses, since the specific characteristics of the family business can favor its innovative capacity over time (Beck et al, 2011; Kellermanns et al., 2008). Also the

Stewardship orientation could enhance the innovative behavior of family businesses, more than non-family (Rau et al. 2018).

On the other hand, the innovative impulse of the company derived from the entrepreneurial character of its founders can be lost, especially in the case of family businesses that can become more conservative over time (Zahra, 2005; Naldi et al., 2007). Business models do not last forever, and the life cycles of the sectors advance in their different stages faster and faster. There is some evidence regarding the average life of companies that hardly exceeds one generation, as revealed by studies in Spain that show an average firm age of 12 years versus 33 years in the case of family firms (Corona, 2015).

De Massis et al. (2016) analyzed some long-lasting innovative family firms to illustrate how the past should be considered as an opportunity to discover knowledge that can be transformed into new products. In this way, past knowledge can be a source of competitive advantages, through the reutilization of existing knowledge within the family and the firm as a basis to innovation. Innovative family firms have special capabilities to leverage tradition in order to develop successful new products and services (Rojas, Lorenzo, and Núñez-Cacho, 2017). Tradition refers to the stock of knowledge, competencies, materials, manufacturing processes, signs, values and beliefs pertaining to the past. De Massis et al. explain how family firms can innovate through tradition as a new product innovation strategy. In this way dynastic families use innovation as the long-term strategic capacity and initiate radical innovations and corporate renewal in order to continue to survive. Thus, time will also be a contingent variable that affects the innovation processes, for example in the relationship between exploitation and exploration of entrepreneurial opportunities (Allison, McKenny, and Short, 2014; Röd, 2016). Ambidexterity changes over time in family firms, so it is so important to consider the temporal dimension in organizational studies in general, and in the research of family firms in particular (Sharma et al., 2014). According to these arguments, we propose the following hypothesis:

H₂: The age of firms influences their innovative capacity

Pittino and Visintin (2009) point out that the founders have a greater orientation towards innovation, adopting a more prospective and analytical strategy than the second generation and following companies. The founders have formal and informal power to allocate resources to explore innovative ideas (Zahra, 2005), while the second and subsequent generations adopt a less entrepreneurial strategy, since they are more interested in preserving the company and maximizing its benefits than in the innovative activities, besides not holding power in the absolute form of the founder, although Craig and Moores (2006) argue that the family business can be more innovative in the generations following the first. Also, when the company is immersed in succession processes, the complexity and uncertainty of this stage can lead to a more conservative attitude, as a result of the presence in the management positions of members of two different generations. The influence of the older generation can lead to more conservative strategies (Ensley and Pearson, 2005), so that the inaction of the new leader still in the consolidation phase can be motivated by an inadequate succession process, in which it has been committed errors or that has been closed in false, propitiating a leadership without the necessary capacities to implant the processes of innovation of suitable way. Therefore, the innovative character can be developed in a different way in each generation.

The innovative character of the family business has been analyzed by Craig and Moores (2006), highlighting that family business attaches great importance to innovation as a key component in its strategy, over time, in a sense comparable to the companies that they operate in advanced technology sectors. In their study, Craig and Moores use a longitudinal sample of family businesses, analyzed in two moments with an interval of 10 years of difference and find a relationship that innovation is related to the life cycle of the company, since companies analyzed family members show significantly higher levels of innovation in the early stages of their development.

However, this innovative drive does not disappear over time, as consolidated family businesses seem to attach great importance to innovation management. These results suggest that innovation continues to be of considerable importance for family businesses, even for those operating in sectors considered more traditional.

As a consequence, we formulate as hypotheses:

H₃: The generation that rules the company influences its innovative capacity.

H₄: The presence of the founder influences his innovative capacity

H₅: Companies that have had a generational renewal are more innovative than those that have not.

3. Research method

3.1 Sample and Procedure

A key issue in every study about family firms is the concretion of what a family firm is. It is not a simple issue because of the lack of a clear differentiation between family firms and non-family firms (Astrachan, Klein y Smyrnios, 2002), in a great extent due to the multidimensional features of the family firms (Uhlaner, 2002; Litz, 1995). According to Gallo (1995), there is a high consensus in considering the ownership, family involvement and desire of continuity as the defining dimensions of family firms.

To the effects of our study, we consider a firm as a family firm according to the first two conditions: ownership and family involvement. The condition for ownership is that the family has more than 50% of the shares. Although some criteria for family firms, as the definition by the European Family Businesses Group and the Family Business Network (Corona, 2015), could consider a listed firm as a family firm when the family owns 25% of the shares, we ask for at least 50% of the shares because most of the firms (97.4%) of the considered population are small and medium enterprises (Lorenzo and Rojo, 2015). We also ask for family members as managers or directors in order to measure the family involvement. The third condition for a firm to be considered as a family firm, that is the intention of continuity across generations, is measured by a specific question in the survey, by asking directly to the managers for this intention.

The data for this study were collected through online surveys questionnaires. The survey was sent to the manager of each company, who were contacted by phone. The sample was composed by 1.509 firms. During the period of phone calling were collected 230 responses, thereby was obtained a rate of response of 15.24%. All of them were companies from the region of Andalusia, one of the largest regions in Spain, with more than 8.5 million of people population.

The firms of the sample were taken from the database SABI. In order to select family businesses, we utilize the criteria mentioned in the theoretical framework section, about family ownership and presence of family members in management or government (or both) of the firm. We also ask the sample's firm about their self-consideration as a family firm. Besides, it were included several questions about the family character in the questionnaire. The sample was finally composed by 155 family businesses and 75 nonfamily businesses that in turn were divided into four different groups: family businesses in first generation, family businesses in second or upper generation, non-family businesses with less than 30 years of age, and non-family businesses with more than 30 years after their establishment in line with Gallo (1995).

3.2 Measures

Dependent variable: Innovation. This variable has been assessed using the scale of Beck et al. (2011). It has been also used in the works of Cooper et al. (1994). Research has supported its construct validity. The scale was composed by 5 items ranged from 1 “totally disagree” to 5 “totally agree”. Cronbach alpha coefficient were 0.893.

Independent variables: Family character; Generational period. We classified the companies according to the answers to five questions about the family character included in the questionnaire. We also divided the companies of the sample by following a second criterion that is the age of the company. In the case of family firms, we consider those that are in first generation as a group and those that are in second or upper generations as another group. In order to introduce the time variable in non-family firms, we divided the sample into two different groups, depending of the age of the company was less or more than 30 years. By doing so, we could compare family firms versus non-family firms in different stages of evolution. Generation in control. To determine the generation in control we relied on data obtained from questionnaire. The CEO of the company indicated the number of the generation which is managing the firm (Rau et al. 2018; Bammens et al., 2008). This variable had 5 possible values, from 1 for first generation, to 5 for fifth and later generations.

Presence of the company founder. This variable was measured according the indication of the CEO that was asked about if the founder were controlling the company. The age of the company was measure through the variable “age of the company” taken from SABI database. The age is calculated as the difference between the year of the foundation of the firm and 2017. The variable existence of generational change was measure by asking to the interviewed about the existence of generational change in the company, giving four choices: without changes, first change, second change, third change and others.

3.3 Results of the analysis of variance

To determine if there are statistically significant differences between the means of two or more independent groups, you can use a one-way analysis of variance (ANOVA). First, this analysis has been used to check whether there are significant differences between family businesses and non-family businesses. Second, the Anova analysis has been used to determine if there are significant differences between the four different groups of companies that have been determined. Third, it has been used to determine net differences between the groups in terms of generation, generational change, presence of the founder in the management of the company and seniority.

Since the samples of all the groups do not have the same size, being therefore an "unbalanced" design, we have carefully analyzed the existence of any violation of the assumptions about the validity of the ANOVA test, about normality, continuity of the variables, independent categorical variables formed by two or more groups, independence of the observations. In addition, the Tukey tests were used to confirm that the differences detected through the Anova were significant, an adequate method for this type of samples of unequal size.

Regarding the presence of outliers, there were no outliers in the data, as assessed by inspection of a boxplot. Normality of the data (by observing the form of the distribution of each of the groups) and they was homogeneous, assessed by Levene's test of equality of variances ($p = .120$).

Once it has been verified that the data verify the necessary assumptions, they were analyzed. The Anova analysis propose:

$$H_0: \text{all group population means are equal (i.e., } \mu_1 = \mu_2 = \mu_3 = \dots = \mu_k)$$

If the Anova one way analysis allows us to reject the null hypothesis H_0 , after that Tukey's post hoc test is performed to compare the means of all the groups and see which ones are statistically different.

Regarding to the results of the Anova analyzes carried out for each of the hypotheses, the hypothesis one, which compared innovation between group 1, including family businesses and group 2 that included non-family companies, it can be observed that there are no significant differences with respect to innovation between group 1 family businesses and group 2 non-family companies, $F(1, 229) = .294$ $p = .588$. (See table 1). Therefore hypothesis 1 that indicated: Family businesses have greater innovative capacity than non-family companies is discarded (Table 1).

Table 1: ANOVA one-way Innovation / family vs non-family analysis

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	.295	1	.295	.294	.588
Within Groups	229.705	229	1.003		
Total	230.000	230			

Source: authors

Next, H_{1a} and H_{1b} hypotheses are analyzed. The first one affirmed that family companies in their different stage of life are more innovative than non-family businesses.

It has been established four groups: 1: Family businesses 0-30 years; 2: Non-family business 0-30 years; 3: Family businesses 30-60 years; 4: Non-family business 30-60.

The Anova test (table 2) highlights that there are statistically significant differences between the four groups, $F(3,220) 2.680$, $p < .048$ confirming the H_{1a}

Table 2: Analysis ANOVA innovation and age groups of companies.

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	8.100	3	2.700	2.680	.048
Within Groups	221.604	220	1.007		
Total	229.704	223			

Source: authors

In order to know what groups are different, it is performed a post hoc analysis using Tukey test (Table 3). The results show that there are not significant differences between group 1 and 2, so the hypothesis H_{1a} is discarded.

Table 3: Post hoc analysis: Tukey test.

Dependent Variable: INNOVACFAC					
	(I) Type	(J) Type	Mean Difference (I-J)	Std. Error	Sig.
LSD	1	2	-.02632986	.16739641	.875
		3	.14349208	.17749871	.420
		4	-.55226492*	.23004195	.017
	2	1	.02632986	.16739641	.875
		3	.16982194	.19398378	.382
		4	-.52593506*	.24298810	.032
	3	1	-.14349208	.17749871	.420
		2	-.16982194	.19398378	.382
		4	-.69575700*	.25005489	.006
	4	1	.55226492*	.23004195	.017
		2	.52593506*	.24298810	.032
		3	.69575700*	.25005489	.006

Source: authors

Regarding to H_{1b} there are significant differences between the groups 3 and 4, being the group 4 (non-family companies 30-60 years) more innovative than group 3 (non-family companies 30-60 years), so this hypothesis is rejected. The table 4 shows the differences between the groups.

Table 4: Homogeneous sub sets.

	Type	N	Subset for alpha = 0.05	
			1	2
Tukey B ^{a,b}	3	49	-.1757856	
	1	92	-.0322935	
	2	59	-.0059636	

Means for groups in homogeneous subsets are displayed.

Source: authors

In relation to the second hypothesis, age and innovation, 6 homogenous age groups have been formed, the first comprising the interval from 0 to 10 years, the second from 10 to 20; the third from 20 to 30; the fourth of 30-40; the 5th from 40 to 50 and the sixth from 50 to 60. It was studied the group formed by the whole companies, analyzing if their age conditioned the innovation. Age is measured by 5-year stretches. The results are the following (see Table 5):

Table 5: Anova and seniority of family businesses

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6.015	5	1.203	1.208	.306
Within Groups	223.985	225	.995		
Total	230.000	230			

Source: authors

There were no statistically significant differences in innovation between the different age, $F(5, 225) = 1.208$ $p = .306$. So the hypothesis was rejected.

The third hypothesis stated that “the generation that governs the company influences its innovative capacity”. In this case, four groups formed by family businesses were made: 1st, 2nd, 3rd, and 4th and ss. (Table 6).

Table 6: Generation and innovation

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	8.060	3	2.687	2.878	.038
Within Groups	141.884	152	.933		
Total	149.944	155			

Source: authors

The innovation was statistically significantly different for different generations in charge $F(3,152)=2.878$, $p < .0038$. Subsequently, the Turkey test allows us to analyze in detail the differences between the four groups proposed (see Table 7 and Table 8). The differences between the groups are showed in the Table 8. The Post hoc tests indicate that is significant between the companies on first generation and the second ones. It could be observed differences between the companies on first and third generation, and there is no difference between the other groups (2 and 3; 3 and 4; 2and 4; 1 and 4).

Table 7: Tukey test difference innovation vs generation

	(I) generation number	(J) generation number	Mean Difference (I-J)	Std. Error	Sig.
LSD	1	2	-.43763306*	.16729605	.010
		3	-.60105634	.33727347	.077
		4	-.20800160	.69047849	.764
	2	1	.43763306*	.16729605	.010
		3	-.16342328	.34880830	.640
		4	.22963146	.69618560	.742
	3	1	.60105634	.33727347	.077
		2	.16342328	.34880830	.640
		4	.39305474	.75527466	.604
	4	1	.20800160	.69047849	.764
		2	-.22963146	.69618560	.742
		3	-.39305474	.75527466	.604

Source: authors

Table 8: Homogeneous Subsets generations / innovation

	Generation	N	Subset for alpha = 0.05
Tukey B ^{a,b}	1	93	-.2080016
	4	2	.0000000
	2	52	.2296315
	3	9	.3930547

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 6.239.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Source: authors

The fourth hypothesis indicated that the founder's presence influences his innovative capacity. In this case, the Anova test shows the following results (see Table 9):

Table 9: Anova founder presence / innovation

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	32.496	39	.833	.823	.754
Within Groups	117.448	116	1.012		
Total	149.944	155			

Source: authors

There were no statistically significant differences in innovation between the groups where the founder was present and the other. $F(39, 116) = .823$, $p = .754$. Therefore the fourth hypothesis was discarded.

Regarding to the fifth hypothesis, it indicated that the companies that have consummated a generational management transference in the government of the firm are more innovative than those that do not. The groups that were studied were the following: There has been no generational change or transfer of management (1); the management has been transferred but the ownership remains in the hands of the previous generation (2); the management and ownership of the company has been transferred (3) (see Table 10).

Table 10: Transfer / Innovation

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	7.206	2	3.603	3.847	.023
Within Groups	142.365	152	.937		
Total	149.571	154			

Source: authors

The innovation was statistically significantly different for different generations in charge $F(3,152) = 3.847, p < .023$. Therefore, there is a different behavior towards innovation in those groups in which a generational change has taken place (see Table 11).

Table 11: Post hoc test transfer / innovation

	(I) Transfer group	Transfer group	Mean Difference (I-J)	Std. Error	Sig.
LSD	1	2	-.509*	.188	.008
		3	-.049	.195	.802
	2	1	.509*	.188	.008
		3	.460*	.225	.043
	3	1	.049	.195	.802
		2	-.460*	.225	.043

Source: authors

In this case, it is observed that the relay and transfer of the company implies different degree of innovation, in particular the Tukey LSD test indicates that the behavior of companies in which there has been no generational change or transfer of management, is statistically significant behavior towards group 2 companies, in which the management has been transferred but ownership remains in the hands of the previous generation (1); those that have been transferred management and ownership of the company (2); and those that have been transferred ownership but not management (3).

4. Discussion

The study of innovation in family businesses has taken us from an initial phase, in which researchers were surprised by the paradoxical results obtained, often contradictory to each other, to a degree of maturity in which are aware that not all family firms behave equally in the face of innovation. Thus, new factors need to be incorporated into the study and that heterogeneity of family firms must be taken into consideration. At this point we have found a factor that can mark the study of innovation in family businesses is time.

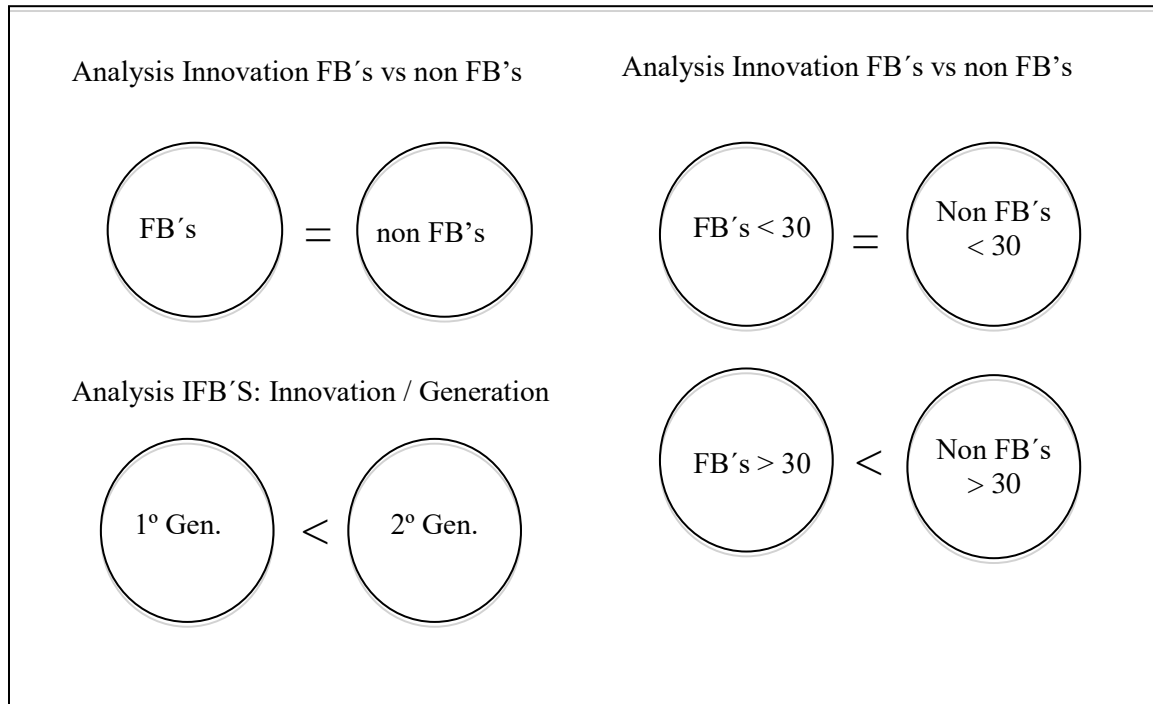


Figure 1: Time and Innovation in family businesses. Comparison of results

The Figure 1 shows that time influences on innovation in two ways, one is the moment to measure the degree of innovation, and another is the moment of life of the company. In relation to the first one, since innovation is a process, if we measure it at the beginning of the process, the innovation in the input that was raised, we will obtain a different result than if we measure it at the end of the process. Similarly, if we measure it when firms are launching a new product we will have a perception of innovation different from if it were measured in the maturity of the product.

On the other hand, innovation behavior is also affected by factors that are derived from the age of the company, transitions or relays in the family business, the generation that is in charge, the presence of the founder of the company. In short, there are a series of factors that condition the results of the study because they cannot be compared with groups with different characteristics.

Our research aims to highlight these differentiating characteristics of the family business before innovation, caused by the variable time. For this reason, we have made two types of comparisons, the first between family and non-family businesses, and the second among family businesses themselves.

The first comparison has been made between the first group, formed only by family businesses and the second group formed by non-family businesses. Well, when performing the analysis without considering any time variable, looking for possible differences between both groups with respect to innovation, the results obtained by the ANOVA test of a factor indicate that there are no significant differences between the means of both groups. This result is in line with other research such as Basco and Calabró (2016). After that, we wanted to introduce a temporary variable to see what results our data offered. This variable could be the generation in control of the company. However, although it was a measurable aspect in family businesses, not in family businesses.

For this reason, we seek a temporary equivalence of the generation, which is also measurable in non-family businesses. The answer was provided by the work of Tapies (2009), which placed the temporal equivalence to a

generational period, around 30 years. For this reason, we group companies assimilating the first generation to the period of 0 to 30 years, and the second generation to the period of 31 to 60 years. In this way, we obtained four groups: the first, family businesses up to 30 years old; the second, non-family businesses up to 30 years old; the third, family businesses with more than 30 years and the fourth, non-family businesses more than 30 years old.

When introducing the time variable, the results of the comparison between groups 1 and 2 show that both family and non-family businesses have a similar behavior in innovation. In other words, there are no significant differences between family businesses and non-family businesses in the early stages of the company's life. However, in the case of older companies, 3 and 4, non-family businesses are more innovative than family businesses. Regardless of other considerations, the results show that when the time variable is introduced in the analysis to discriminate the categories, the results are different from the previous analysis, which was the case of hypothesis 1, in which temporal considerations were not included.

Focused on the results of family businesses, to introduce the temporary nature of these organizations, we use the generation in command. Well, the Anova analysis of differences between the companies of the four generational groups (first, second, third and fourth or greater), showed different behaviors between the groups in innovation. That is, according to the generation in charge in the company, this will be more or less innovative. In the post hoc evaluation of the results, using the Tukey test, we observed that the second generation was the most innovative.

5. Conclusion, limitations and future research lines

In the study of innovation in family businesses, it is necessary to take into account the time variable and the temporal heterogeneity of the companies. As we have seen in the article, heterogeneity is not exclusive to family businesses, also those that are not family businesses, since these also exhibit different innovation behaviors at different stages of life. In this context, the time elapsed since the creation of the company, the generation that is in charge and, specifically, the presence of the founder in it can condition the results of the innovation processes in the case of family businesses.

Therefore, the first contribution of this work to the study of innovation in the family business is that we have to consider the time variable as a critical factor with respect to innovation, both for the time or the life cycle of the company, as for the moment in which we measure innovation.

As a second contribution, it should be noted that the generation in charge conditions the company's behavior in the face of innovation. In this sense, we observe how the second generation is more innovative than the first. We also conclude that there are no significant differences between family businesses and non-family businesses in the early stages, with respect to innovation behavior. It could be that the initial innovative impulse that leads the entrepreneur to create a business does not depend on the family condition of the company. In addition, continuing with the analysis of family businesses, those that have completed the generational change are more innovative than those that have not.

This document has certain limitations. First, the use of questionnaires and small samples to collect information implies the specific limitations that arise from the subjectivity involved in the use of this tool. When questionnaires are used, the researcher does not directly address the phenomenon under study and respondents have a margin of freedom of interpretation that can distort the target set. In addition, respondents' responses may reflect their own prejudices, since many items are based on the respondent's perception.

Another limitation originates in the horizontal nature of the investigation. The information was collected at a given time, with the exception of certain innovation indicators. It would be worth analyzing these relationships

between innovation and independent variables through the use of prolonged periods to isolate temporal phenomena that could distort the result, as we formulate in this article.

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Pedro NÚÑEZ-CACHO, Ph. D. is Professor of Business Organization in the department of Business Organization of University of Jaen (Spain). He is also member of the Santander Family Business Chair of Jaen University. Research interests: Innovation, family businesses, sustainability.

ORCID ID: <https://orcid.org/0000-0003-3674-7715>

Daniel LORENZO, Ph. D. is Associate Professor of Strategic Management in the department of Business Organization of University of Cádiz (Spain). He is also head of the Santander Family Business Chair of Cádiz University, and Fellow of Family Firm Institute. Research interests: Innovation, family businesses, sustainability.

ORCID ID: <https://orcid.org/0000-0002-2935-449X>

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IMPACT OF ENTREPRENEURIAL CHARACTERISTICS ON CREDIT ACCESSIBILITY: CASE STUDY OF SMALL BUSINESSES IN WEST SUMATERA – INDONESIA*

Teti Chandrayanti*¹, Sulaeman Rahman Nidar², Asep Mulyana³, Mokhamad Anwar⁴

¹ Universitas Ekasakti, Faculty of Economics, Veteran Dalam No.26 B Padang 25113, Indonesia ^{1,2,3,4} Universitas Padjadjaran, Faculty of Economics & Business, Dipati Ukur No 46, Bandung 40132, Indonesia

Emails: ¹teti.chandrayanti@yahoo.com; ²sulaeman.rahman@fe.unpad.ac.id; ³asep.mulyana@fe.unpad.ac.id; ⁴mokhamad.anwar@fe.unpad.ac.id

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Abstract. Currently, the studies on entrepreneurial characteristics do not distinguish the business scales, while different scales of businesses, i.e. small, medium to large scales have their own characteristics. The purpose of this research was to determine whether business performance mediates the impact of entrepreneurial characteristics on accessing credit at small-scale business. In this study, a total of 221 questionnaires was distributed to the respondents of small enterprises entrepreneurs in West Sumatera Province, Indonesia using the method of the purposive random sampling. The hypotheses were tested using survey data from small enterprises that had obtained bank loan. For data analysis, the Structural Equation Model (SEM) was used. Based on the study results, the entrepreneurial characteristics positively affect the business performance, which then positively affects the chances of access to the credit. Ultimately, it was proven that entrepreneurial characteristics affect the access to credit. The research finding highlights the important of the role of business performance in mediating the effect of entrepreneurial characteristics on credit access. Therefore, it is recommended that there should be a strategy to strengthen the entrepreneurial characteristics to improve the small business performance. In addition, the entrepreneurs are recommended to develop and maintain a strong entrepreneurial characteristics.

Keywords: entrepreneurial characteristics; business performance; small business; credit access

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1. Introduction

Small enterprises in Indonesia are still constrained with the limitations in operating their business, such as lack of capital, the poor quality of human resources, lack of access to the market and the limitation in skills and technology. However, the major constraints they are encountering are mostly lacks of capital. A small business is economically productive, having the assets of a maximum of IDR 50 - 500 million excluding land and building, or annual sales of IDR 300 million - 2.5 billion (Micro Small Medium Enterprises (MSME) regulation in Indonesia (Ministry of Cooperation, Small and Medium Enterprises Regulation No. 20 years 2008). Other definition is provided by the Indonesian Central Bureau of Statistics (2018) that small business is classified as those which have 5 – 19 workforces. In this research, the concept of small business is classified by Regulation No. 20, 2008 based on the asset and sales and according to the Central Bureau of Statistics based on the number of workforces.

The limitation of capital and difficulties in accessing the source of funding are becoming a major problem for small business. Similarly, Lekhanya (2016) found the same result that the lack of finance become the obstacles for rural small medium enterprises to survive and to grow in South Africa. Likewise, in India, access to finance is widely perceived as an essential factor for firms, and especially to maintain their daily business operation and to achieve long term investment opportunities and development target (Biswas, 2014). Even in Algeria, financial constraints are high for both small medium enterprises (SME) and large firms (Bouazza, Ardjouman & Abada, 2015). According to BI & LPPI (2015), of 57 billion unit of micro small medium enterprises (MSMEs) in Indonesia, only 30% has the ability to access finance. Out of the percentage, 76.1% earned credits from banks, and the rest earned credit from non-bank. It means that in Indonesia, 60 – 70% of MSMEs have no access to the banks credit. Although finance from banks is a great financial source, they have difficulties to fulfill the bank requirements for obtaining the loan.

The business performance becomes the consideration for banks to provide lending. However, lack of the business information or financial statement of the small businesses made the banks have to find other indicators to measure the business performance. Therefore, the requirements of credit should reflect the capability of business or their performance as the first criterion for selection. Such information can usually be seen from the financial statements which are published to the public; yet, small enterprises can hardly provide it because of some limitations in their resources. Even, they do not have financial statements at all.

Some factors influence the small business owners to acquire loan from banks. Oladele, Oloowokere & Akinruwa (2014), revealed that there was a connection between available financial source and the owners of small medium enterprises and their business performance. Meanwhile, the business performance is influenced by internal and external factors (Munizu, 2010; Nicolescu, 2009). In other words, there is a correlation between business performance and the access to credit. The successful business owners will tend to convince that they have the ability to repay the loans.

This study examined the relationships between entrepreneurial characteristics, business performance and credit access at small business in West Sumatera, Indonesia. The study used combination of two dimensions of entrepreneurial characteristics, i.e. demography characteristics and entrepreneurial orientation. According to Setyawan et al. (2015), entrepreneurs as human resources have important role in managing the business. The model of hypothesis study was developed and tested using Structural Equation Model (SEM). Furthermore, this paper does not only testify the effect of entrepreneurial characteristics on the access to credit, the effects of entrepreneurial characteristics on business performance, but it also tests this mechanism works through analysis on the mediating effect of business performance. It is expected that the study finding proposes some strategies to strengthen the small enterprises abilities to access the banks credit.

2. Literature Review

2.1. Entrepreneurial characteristics

Entrepreneurial characteristics are the possession of certain personalities that expose an individual toward entrepreneurial behavior (Westhead, 2011). Meanwhile, Fatoki & Asah (2011) stated that entrepreneurial characteristics are the traits or attributes that are specific to the owner of the firm which can influence on the performance of the firm negatively or positively. According to Islam et al. (2011), the entrepreneur characteristics referred to demographic characteristics, individual characteristics, personal traits, entrepreneur orientation and entrepreneur readiness. Fatoki & Asah (2011) stated that according to Lumpkin & Dess (2001), the concept of entrepreneurial orientation consists of five dimensions: autonomy, innovativeness, risk taking, pro-activeness and competitive aggressiveness. In this study, only demographic characteristics and entrepreneur orientation were used to explain the entrepreneur characteristics (Wekesa et al., 2016; Islam et al., 2011; Fatoki & Asah, 2011).

2.2. Business performance

Business or firm performance refers to its success in the market, which may have different outcome (Islam et al., 2011). Wheelen and Hunger (2015) noted that the performance of a business is the final result of empowering resources through efficient and effective strategies. The same description was given by Adebisi et al. (2015) that the performance is the ability of a business to use resources effectively. Meanwhile, Lingensiya (2012) explained that performance is the ability of a business to use its own resources in competition and its readiness to face external pressure, including globalization. According to Adebisi et al. (2015), the performance of a business can be expressed by financial and non-financial means. The same opinion was stated by Lingensiya (2012) that business performance can be measured by financial and non-financial means. Harash et al. (2014) in their research noted that business performance were indicated by (1) financial performance, (2) market performance and (3) the level of return to the shareholder. Based on the previous research, in this research the dimension of business performance were financial measures (capital, profit, sales) and non-financial measures (market) (Adebisi et al., 2015; Harash et al., 2014). There are four dimensions of the performance variables that are growth of capital, sales, profit growth and market (Adebisi et al., 2015; Harash et al., 2014).

2.3. Credit access

Access to credit is defined as the ease of small business which can secure financial assistance or loans from lending institutions (Kitili, 2012). Another definition of access to finance is provided by Claessens & Tzioumis (2006). It refers to the availability of supply of quality financial services at a reasonable cost. According to Kira and He (2012), credit access is the ability to get credit for financing business. The other explanation was given by Nakinyingi (2010) that the access to credit is if there is no restriction related to cost administration or procedure from financing institution that they intend to propose for credit. It has two dimensions, i.e. the number and frequency of credit received. Akudugu et al. (2009) emphasized that access to credit is the situation where individuals have the rights to make decisions related to the allocation in the short term and repay according to the schedule and interest rate committed. Credit access can be stated as the ability and the will of the owner/manager of business to obtain credit (Ogubazhi & Muturi, 2014), and also the ability of the company to obtain and use financial services which can be used according to the need (Claessens, 2006). In the present study, two dimensions were used to explain the access to credit variable, such as the amount and frequency of credit received (Nakinyingi, 2010; Nkundabanyanga et al., 2014).

2.4. Relationship between entrepreneurial characteristics and business performance

Based on the findings from previous studies, entrepreneurial characteristics had a significantly positive effect on the business performance (Islam et al., 2011; Ganyaupyu, 2013; Mothibi, 2015; Wekesa et al., 2016; Garg & Phaahla, 2019) and determined the success of business. According to Garg and Phaahla (2018), entrepreneurship relates to an entrepreneur's specific activity in decision making process. Meanwhile, according to Islam et al. (2011), the entrepreneur's characteristics can be classified into demographic and individual characteristics,

personal trait, entrepreneur orientation, and entrepreneur readiness. Then, Islam et al. (2011) pointed out that the entrepreneurs' characteristics have positive and significant effects on the business success in SMEs at Bangladesh. Therefore, a small business owner have to have clear mission and strategy about their business. Furthermore, building a strong social network and having good government relationship becomes significantly important. Furthermore, this study applied demographic characteristics and entrepreneur orientation as variable indicators for entrepreneurial characteristics. Therefore, only relationship between entrepreneur characteristics (demographic characteristics & entrepreneurial orientation) and business performance will be discussed in this paragraph). According to Soomoro, Abdelwahed & Shah (2019), demographic characteristics of entrepreneur consisting of gender, age, education and experience have a positive and significant role to raise the entrepreneurs in Pakistan. This finding is supported by Ganyaupfu (2013) and Mothibi (2015).

Moreover, according to Lucas (2017), entrepreneur's level of education has a positive effect on the business performance since it enhances the entrepreneurs' self-confidence and self-efficacy and finally improves business management. Also, Indarti & Langenberg (2004) stated that education level of the business owner has a significant relationship to the business success. Educational background of the entrepreneurs influenced their learning process, understanding and analyzing the business condition quickly. According to Peter & Musyitha (2015), the education level of an entrepreneur influences the business performance. Educated entrepreneurs will have the ability to manage their businesses and make financial statement to develop their businesses. In addition, educated entrepreneurs will also have the ability to be self-learning. Nyoni & Bonga (2018) recommended that entrepreneurship education should be promoted to improve the business performance. They argued about the need of formal education as important resources for entrepreneurs because it will give good technical knowledge to identify business opportunities. Essel, Adam & Amankwah (2019) added that higher educated entrepreneurs tend to adopt more innovative practices compared with other counterparts whose no or low formal education background. However, Wekesa et al. (2016) found that education is not a significant influence on the performance, but uneducated entrepreneurs can have better business performance due to, they have experience and managerial training skills. Amateifio & Agbeblewu (2017) explained that the education level has no significant influence on the performance of SMEs in the Accra metropolis, but the owners/managers have to learn about practical knowledge by continuously learning in managing business, reading and listening to the experts, attending seminars and learning from other people's experience.

According to Khaleque (2018), business experience has a positive influence on sales and finally on the business performance. Lampadarios (2017) added that a senior experience manager is more likely to avoid common pitfalls, has solid outlook for the future, guides the company through hardship and recognizes the threats and opportunities in the environment in order to ensure sustainable growth. Mothibi (2015) explained that based on his research on SMEs in Pretoria, South Africa, statistically, managerial competence and education have the highest significantly positive effect on SMEs success. Therefore, educational qualifications and managerial competences of SMEs entrepreneurs should be improved in respect to the business operations. According to Weekesa et al. (2016), firms will have a better performance if they are operated by young, well-experienced and skilled entrepreneurs. Garg & Phaahla (2018) added that entrepreneurial, technical and managerial skills and the ability to conduct market research are essential skills that should be possessed by the owner/manager of small business to succeed and grow.

In regard to gender, according to Nyoni & Bunga (2018), many researchers found that males have significantly higher entrepreneurial intentions than their counterpart and tend to be risk taking persons. Lucas (2017) pointed out that in Kenya, in the MSMES sector, male entrepreneurs performed better compared to the female entrepreneurs because males are more willing and ready to take risks and less family responsibilities compared to females. Osunsan (2015) added that there was a significant effect of gender on small business performance. Although the level of business performance owned by male and female entrepreneur were high, but the male owned business tended to perform better than their counterpart. Likewise, the same opinion was also stated by

Soomro, Abdulwahed & Shah (2017) that there was a positive and significant relationship between the gender of entrepreneurs and business success of SMEs in Pakistan. In their research, the male respondents accounted for 82.6%, while female ones were 17.4%.

In Indonesia's context, Elfindri, Ayunda & Saputra (2010) agreed that 85% of Minang entrepreneurs have difficulties in managing business at their ages around 40 if the business is run only based on the entrepreneur's talent. However, different opinion was stated by Munizu (2010) and Wekesa et al. (2013) with some arguments. The latter stated that although education had an insignificant influence on business performance, the uneducated, yet skilled and experienced entrepreneurs tended to manage their businesses successfully. The age of an entrepreneur influences the success of the business (Kemayel, 2015). According to Peter & Musyityha (2015) the older the entrepreneurs, the greater the opportunity they have to manage their business successfully. However, Wekesa et al. (2016) had a different opinion that the age of the entrepreneur had a negative relationship with the business performance. The younger entrepreneurs usually accept the changes quickly and take the opportunity promptly compared to the older ones. Adzido, Sedzro, Dorkpah (2016) added that the entrepreneurs whose age less than 50 years (productive age) must be supported with a good education that will affect the way the entrepreneurs manage their business. Contrary to the arguments, Indarti & Langenberg (2004) found that there was an insignificant correlation between the age of entrepreneur and their business success.

According to Abdulwahab & Damen (2015), there was an impact of the entrepreneur characteristics on the small business success. In their research, entrepreneur characteristics were measured by the need for achievement, self-confidence, innitiativeness, autonomy, risk-taking propensity, and experience. Meanwhile, Hosain & Asheq (2019) described the role of entrepreneurial orientation to SME performance in Bangladesh. They explained that all dimensions of entrepreneurial orientations possessed a positively significant effect on SME performance except for competitive aggressiveness. On the other hand, Oni, Agbobli & Iwu (2019) stated that only three attributes of entrepreneurial orientation influenced business performance which are innovativeness, risk-taking and pro-activeness. It was expected that the owner/manager of small business should integrate & cultivate cultures that support entrepreneurial orientation in order to be more successfull in the business operations. Mason et al.(2015) found that there was a positive and significant impact of innovativeness, risk-taking behavior and pro-activeness in explaining the performance. Bhatt & Sankhla (2018) explained that risk-taking ability, good communication skills and self-confidence are the major characteristics which have the impact on business success. Lampadarios (2017) investigated that the entrepreneurial orientation has a very strong relationship with the performance because it relates with the longevity and long-term performance. Schillo (2011) argued that in general, entrepreneurial orientation may contribute positively to the performance, but every business has a different combination of external influences and internal corporate characteristics. Frese, Brantjes & Hoorn (2002) investigated that there were mediating effect of perceived environmental difficulties on the relationships between entrepreneurial orientation and success. The entrepreneurial orientation has a positive and stronger impact on the business performance in a dynamic environment (Giriati, 2017).

2.5.Relationship between entrepreneurial characteristics and credit access

Several previous studies (Fatoki & Asah, 2011; Chinonso & Zhen, 2016; Campanella & Serino, 2018) revealed that characteristics of owner/manager affected firm's capability to access bank loan. The differences of personal characteristics will make differences in the ability of entrepreneur to improve financial performance (Irwin and Grayson, 2006)

Regarding to the age of owner/manager, there are several studies investigating the effect of entrepreneurs' age on the access to finance. Some studies (Kung'U, 2011; Fatoki & Asah, 2011; Ogubazhi & Muturi, 2014, Campanella & Serino, 2019) found out that the owner's age/manager has a significant effect on SMMEs's access to the bank loan. According to Kiboki, Sakwa & Kiriago (2014) the mature owners of firms are more likely to access the credit. The effect of entrepreneurs's age on the ability to access the bank credit can be viewed from both creditor

and debtor perspective (Chinonso & Zhen, 2016). The older entrepreneurs are perceived as non-innovative and non-dynamic, while the younger ones are regarded as innovative and good performers. Therefore, the older entrepreneurs are less riskier compared to the younger ones. Ogubazghi & Muturi (2014) stated that age is one of the most general factors which affects the access to bank loan; therefore, the age of the owner/manager has a significant effect on SMMs' access to the bank loan in Eritrea Kenya. Furthermore, Campanella & Serino (2019) added that older applicant has a higher possibility of being accepted when applying for loan, due to entrepreneurs' age is positively correlated with the acceptance probability.

Numerous studies such as of Kung 'U (2011), Ogubazhi & Muturi (2014), Faisal et al (2018) and Campanella & Serino (2019) confirmed the educational level of manager/owners firms has an effect on the access to credit. According to Chinonso & Zhen (2016) higher education will improve communication skills, and foresight of the owners/managers. Also, they will have the ability in preparing a business proposal and financial statement. In general, educated entrepreneurs have the skill to manage their resources, such as human, financial, and marketing resources. It will lead to the high performance of business and they do not need to encounter unnecessary difficulties in accessing the bank loan. In addition, the importance of education is emphasized in general as it enhances the entrepreneurs with literacy, so they are able to manage their business properly and perform record keeping of their business (Faisal et al., 2018). Furthermore, Chioma et al. (2017) argued that education significantly contributed to the ability of poultry farmers to access to the credit because higher level of owner/manager's education will lead to the higher productivity compared to their counterparts with lower education. Educational level determines the degree of opportunity to enhance living condition. Enterprises with higher educated owners and diversified enterprises are more likely to receive formal credit (Nikaido, Pais, and Sarma, 2015). Hendrawan (2012) explained that higher educated owner/manager tends to present a good rational reason and provide a well-prepared proposal to earn bank credit. They also have better knowledge, skill, and ability and also are more confident. Nevertheless, this finding is not in agreement with that of Campanella & Serino (2019) who stated that entrepreneurs' education factor is insignificant related to the probability to earn credit from banks.

Prior studies (Kung'U, 2011; Hendrawan, 2012; Rabah Gana & Ayari, 2013) stated that entrepreneurs' experience affects the ability to access the credit. Therefore, lack of managerial experience has a negative effect for SMEs to earn finance from commercial banks (Chinonso & Zhen, 2016). Kung'U (2011) added that previous experience will impact to the skill of the owner/manager's business. The business skills of entrepreneurs influence their ability to access credit and to manage their business successfully. Studies conducted in the past have found that the gender of firm's owner/manager influences the access to finance.

Chinonso & Zhen (2016) and Campanella & Serino (2019) discovered that gender has a positive impact for SMEs on access to finance by SMEs. In Italy, if applicant/manager is a male, it will be a higher possibility for him to have his credit application accepted by officers (Campanella & Serino, 2019). Meanwhile, female entrepreneurs tend to be riskier than their counterpart (Chinonso & Zhen, 2016). Female owners of enterprises engaged in capital intensive industries are more likely to encounter credit constraints (Nikaido, Pais, Sarma, 2015). Chinonso & Zhen (2016) argued that gender has a significant influence on the accessibility of debt finance for SMEs in Nigeria. In contrast, Fatoki & Asah (2011) argued that there is no significant relationship between the gender of the SMEs owner/manager and the access to debt finance. However, contrary to the above findings, Irwin and Grayson (2006) stated that women entrepreneurs of micro-finance institution in the developing country were easier to raise finance than men because women had better track record in repaying their loan.

According to Fatoki (2017), there is a significantly positive relationship between the entrepreneurial orientation, the access to debt finance and the performance of SMEs. In this study, the access to debt finance partially mediates the relationship between entrepreneurial orientation and the business performance. Sidek, Mohamad, & Nasir (2016) stated that the entrepreneurial orientation and the access to financial services is inter-related each

other. In addition, an effective entrepreneurial orientation can be applied as good predictor of firm's ability to access financial resource. However, studies on the relationships of the factors are limited. They added that the entrepreneurial orientation supports the business to get the access to the capital resources and therefore their business performance should be improved. Furthermore, there are only risk taking and aggressive competitiveness which have positively significant impact on the access to finance. There is a significantly negative relationship between entrepreneurial orientation and SMEs ability to access finance in Nigeria (Aminu and Shariff, 2015).

2.6. Relationship between business performance and credit access

Kiboki, Sakwa & Kiriago (2014) stated that the business performance affected access to finance. The performance can be measured by financial and non-financial indicators. According to Gerba & Viswanadham (2016), it includes profitability, total asset, return on investment (ROI), sales volume, employment size, capital employed, market share, costumer satisfaction, productivity, turnover, delivery time, employees' turnover and others. Some previous studies explained that business information had an impact on access to credit (Kira & He, 2012, Fatoki & Asah, 2011; Fatoki & Odeyemi, 2010). There was a positive relation between financial information and access to debt finance due to the factor that financial statements showed business ability to meet the financial obligation (Nangaki, Namusonge, & Wandera, 2014). According to Adzido, Sedzro & Dorkpah (2016), a business with increasing trends of profits and sales are more attractive to banks than the poor performing ones. However, they require reliable financial information, preferably audited financial statements as useful basis for granting credit facilities. Business information exhibits the business current asset, future performance and the ability of the business to repay loan (Kira & He, 2011). Meanwhile, Pandula (2011) pointed out that financial performance was the main factor that influenced the access to finance. The same opinion was stated by Sarapaivanich & Kotey (2006) that there was a significantly positive effect of financial information quality on the ability to access external funds for SMEs in Thailand. Kitindi, Magembe & Sethibe (2007) revealed that financial information provided by lenders was used by creditors, banks, and the lenders to analyze their business performance and to predict future performance. Fatoki & Asah (2011) added that information obtained from financial statement can be used as indicators of borrower's future prospects and the ability to repay loan. Therefore, there was a positive relationship between financial information maintained by a firm and the access to debt finance. Kira & He (2012) explained that the lenders used the business information to decide borrower's credibility whether to issue or to extend a loan. Absence of sufficient information leads to information asymmetry and may jeopardize the access to credit finance (Sarapaivanich & Kotey, 2006). Therefore, business performance influences the credit access because from lenders perspective, the performance predicts ability of small business to repay its loan.

Problem Statement

Small Enterprises (SEs) have an vital role in economic growth and development of debt financing. The ability of small business to obtain bank's loan is low due to a number of factors. Entrepreneurs as human resource plays a great impact on accessing the credit. From the borrower's side, business performance can be predicted as the ability to repay loan. Therefore, objectives of this research are to conduct empirical examination on the role of business performance as a mediator of the influence of entrepreneurial characteristics on small business accessibility to debt finance.

Research Objectives

The objectives of the research are:

1. What is the role of entrepreneurial characteristics in business performance?
2. What is the role of entrepreneurial characteristics in credit access?
3. What is the role of business performance in credit access?
4. Does an entrepreneurial orientation influence credit access partially through affecting business performance?

3. Research Methodology

The research was carried out in seven districts in West Sumatera Province, Indonesia. The study used a survey method and the total unit analysis consisted of 221 small businesses, the details of which were as follows: in Pasaman (13 units), Pesisir Selatan (18 units), Dharmasraya (16 units), Bukittinggi (32 units), Padang (100 units), Solok (22 units) and Payakumbuh (22 units). Stratified and purposive random sampling was used in selecting the respondents for the study, while the observation unit was the owners/managers of the small businesses. In this study, several districts were selected as the samples based on the consideration that in the areas, there were at least 4% of the total number of small scale businesses operating in West Sumatera. In this study, the data were collected using structured questionnaires and all the variables were measured using a five-point Likert scale with level 1 = strongly disagree, 2 = disagree, 3 = fairly agree, 4 = agree and 5 = strongly agree. The time horizon of this research was the cross-section /one shoot.

Conceptual framework is provided in Figure 1 below

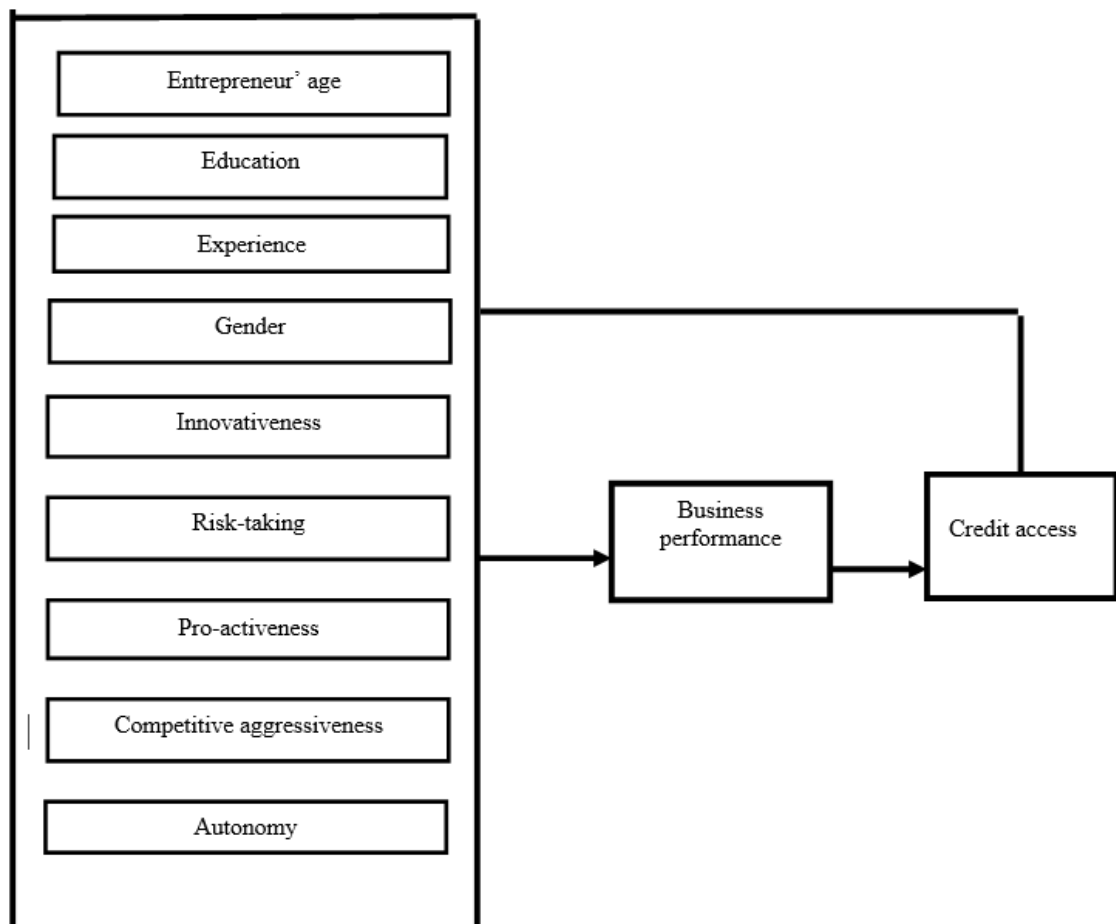


Figure 1. Conceptual framework showing ties between entrepreneurial characteristics

The research model above illustrates that entrepreneurial characteristics are considered to have an indirect influence on access credit through business performance. Moreover, entrepreneurial characteristics also have a direct influence on credit access.

To examine the effect of entrepreneurial characteristics on business performance and credit access, the following hypotheses are proposed.

Hypothesis 1: Entrepreneurial characteristics has a positive relationship with business performance.

Hypothesis 2: Entrepreneurial characteristics has a positive relationship with credit access.

Hypothesis 3: Business performance has a positive relationship with credit access.

Hypothesis 4: Business performance has a partial mediating effect on entrepreneurial characteristics and credit access.

4. Results

The Validity and Reliability

The validity and reliability are the two main criterion used in SEM. The validity criteria were assessed using Confirmatory Factor Analysis (CFA) or loading factor. The reliability was assessed using Construct Reliability (CR) and Variance Extracted (VE). The result of validity and reliability can be seen at table 1.

Table 1. Construct Reliability and Validity Analysis

Variable	Dimension	Loading Factor	CR>0.70	VE> 0.50
Entrepreneurial Characteristics	Entrepreneurs' age	0.881	0.923	0.820
	Education	0.929	0.881	0.717
	Experience	0.837	0.889	0.724
	Gender	0.924	0.911	0.774
	Innovativeness	0.918	0.921	0.705
	Risk taking	0.954	0.871	0.694
	Pro-activeness	0.858	0.910	0.772
	Competitive Aggressiveness	0.878	0.876	0.779
	Autonomy	0.900	0.893	0.745
Business Performance	Capital growth	0.828	0.887	0.728
	Sales	0.861	0.884	0.721
	Profit growth	0.873	0.894	0.808
	Market growth	0.784	0.818	0.600
Credit access	Amount received	0.649	0.963	0.705
	Frequency of access	0.878	-	-

The result of the analysis in Table 1 shows a validity and reliability test for each construct. Loading factor at all constructs which were analyzed above 0.5 considered valid. Also, they have $CR \geq 0.7$ and $VE \geq 0.5$ Therefore all constructs are considered valid and reliable (Hair et al., 2014).

Based on Table 1, it can also be stated that all dimensions of entrepreneurial characteristics have positive loading factors. Demography characteristics consisting of entrepreneur's age, education, experience and gender have a positive influence both on business performance and credit access. The study results are consistent with the findings of Lucas (2017) who stated that education level, gender, experience, and age of entrepreneurs (Nyoni & Bonga, 2018) have a positive effect on the performance. Peter & Munyithya (2015) agreed that education level and age of the entrepreneurs influenced the entrepreneurial success in Kituy County. Also, they added that cultural background and marital status affected the business performance. Education becomes the largest dimension of demographic characteristics that was found to be the most influential. This is consistent with other studies, such as Mothibi (2015) who stated that managerial competence and education had the highest positive and significant influence on SMEs success. Furthermore, similar results have been found by Indarti & Langenberg

(2004) who revealed that education of SMEs entrepreneurs has an important role in the success of business in Indonesia. However, this result is contrary to that of Wekesa et al. (2016) & Amarteifio & Agbeblewu (2017) who found that educational level have no significant effect on business performance, but they agreed that uneducated entrepreneurs should be supported by management skills and experience.

Regarding the entrepreneurial orientation, all loading factors are positive. In other words, innovativeness, risk taking, pro-activeness, competitive aggressiveness and autonomy affect the business performance. The result of this study is in line with previous research conducted by Hosain & Asheq (2019) who investigated the effect of entrepreneurial orientation on SMEs performance by using five-dimensional aspects in boutique and clothing business in Bangladesh. They suggested developing the level of entrepreneurial orientation by arranging a periodical training session for the employees in order the business to survive and sustain. Lampadarios (2017) added that entrepreneurial orientation plus prior work experience, and management skills are the major points for SMEs entrepreneurial success factor in the UK chemical distribution industry. The condition of environment will result in different impact on the business. In a dynamic environment, the entrepreneurial orientation provides stronger effect.

In regard with risk taking, it can be considered the greatest influence of entrepreneurial orientation in this study. Risk taking is an activity to consider and accept the risks in decision making process to face an uncertainty condition (Suhardi, 2009). The ability of business owner to take an action according to the level of risk influence the business success (Elfindri, Ayunda & Saputra, 2010).

The findings show that all dimensions of entrepreneurial characteristics have positive value. In other words, entrepreneur's age, education, experience, gender, innovativeness, risk taking, pro-activeness, competitive aggressiveness and autonomy have positive and significant effects on credit access. The results are consistent with some previous studies. Gender, education (Irwin & Grayson, 2006), age (Ogubazghi & Muturi, 2014; Campanella & Serino, 2019) and experience (Faisal et al., 2018) are positively associated with the access to formal credit. Chinonso & Zhen (2013) and Faisal et al. (2018) added that networking, membership in a business associations or groups affect the access to credit. Regarding the level of education, there are several studies that investigated the effect of education on access to finance, but there are conflicting results. Some studies (Indarti & Langenberg, 2004; Irwin & Grayson, 2006) found that education influenced access to credit. On the contrary, other studies conducted by Ogubazghi & Muturi, 2014; Campanella & Serino, 2018) investigated that there was no relationships between the entrepreneur's education and access to credit.

Regarding the entrepreneurial orientation, there is a relationship between entrepreneurial orientation and credit access. This findings is consistent with the previous research conducted by Fatoki (2017) and Sidek, Mohamad & Nasir (2016) who stated that entrepreneurial orientation influences positively the access to financial service. However, these study results is contrary to those of Aminu & Sharif (2015) who stated that there was a significantly negative relationship between entrepreneurial orientation and SMEs access to finance in Nigeria.

Direct Effects

The study results support the hypotheses testing as follows:

Table 2. The Result of Structural Model Parameter Estimation

Path	Standardized	t-value
Entrepreneurial characteristics → business performance	0.39	4.938
Entrepreneurial characteristics → credit access	0.217	3.638
Business performance → credit access	0.494	7.708

As can be seen from Table 2, the findings explain the following results.

Hypothesis 1:

Entrepreneurial characteristics has a positive and significant effect on business performance.

Regression coefficient = 0.39 ; $t_{value} = 4.938 > t_{table} = 1.96$

As expected, this finding supports earlier study (Soomro, Abdelwahed & Shah, 2019) which revealed that demographic characteristics of entrepreneurs, such as gender, age, education and experience have a positive and significant impact on SMEs entrepreneurs' success in Pakistan. It suggested that demographics variables should be upgraded in order to grow the business. In line with previous research carried out by Islam et al. (2011) that the characteristic of entrepreneur was found to be a significant factor for the business success, it is suggested that enterprises have to build a strong social network and good government relationship. This findings is consistent with the results of previous research which was conducted by Schillo (2011) and Fatoki (2017). Lampadarios (2017) added that entrepreneurial orientation is one of the main driving factors of growth of small business; therefore, it needs to be applied as part of the company activities and the business culture in daily activities. More powerful entrepreneurial characteristics will lead to improved competency of SMEs owner, and eventually affect the business performance (Sarwoko et al., 2013).

Hypothesis 2:

Entrepreneurial characteristics has a positive effect on credit access.

Regression coefficient = 0.217; $t_{value} = 3.638 > t_{table} = 1.96$

This finding is consistent with that of previous research carried out by Chinonso & Zhen (2016) and Campanella & Serino (2018). Fatoki & Asah (2011) stated that improving access to finance can be done by personal development of the SMEs owners, especially in the area of business and financial management via training. Kung'u (2011) added that business skill of managers/owners of small business influenced their ability to access credit and to manage business successfully. Meanwhile, entrepreneurial orientation will support enterprise in obtaining access to capital (Sidek, Mohamad, & Nasir, 2016).

Hypothesis 3:

Business performance has a positive effect on credit access.

Regression coefficient = 0.494; $t_{value} = 7.708 > t_{table} = 1.96$

The same result expressed by Kiboki, Sakwa & Kiriago (2014) who found that business performance has a significant effect on credit access. In other words, better business performance will lead to the greater accessibility of external finance compared to poor performance. Good business performances show the ability of business in repaying its loan. Similar result was also revealed by Nangaki, Namusonge & Wandera (2014) who stated that financial performance of business had positive influence on credit access.

Sobel Test

Sobel test can be used to test the role of variable mediation.

Table 3. Hypothesis testing for partial mediation

Variable mediation influence	Regression coefficient	Error standard	Sobel test	t table	Description
Entrepreneur characteristics → business performance	0.398	0.080	7.745	1.96	Significant
Business performance → credit access	0.494	0.063			

Based on Table 3, the influence of entrepreneurial characteristics on credit access which is mediated by the business performance shows significant results. t_{Sobel} is higher than 1.96 ($t_{\text{Sobel}}=7.745 > t_{\text{table}}=1.96$); therefore, the relationships in Table 3 are significant.

Hypothesis 4: Business performance has a partially mediating effect on entrepreneurial characteristics and credit access.

The result of this study confirmed that entrepreneurial characteristics is important for business performance and credit access. Implementation of entrepreneurial characteristics will help small business improve its performance and it will lead to a greater accessibility to earn the bank loan. This study is also in line with those conducted by Kiboki, Sakwa & Kiriago (2014). Cull and Xu (2005) added that banks tend to allocate funds to firms that have better performance outcomes in China. Poor business performance is the major reason why small enterprises does not receive credit (European Commission, 2003). In other words, Business with good performance tends to obtain credit easier compared to poor performance ones. Good business performance means that business has the ability to operate continuously and able to repay its credit.

Indirect Effects

Table 4. The effect of entrepreneurial characteristics on credit access via business performance

Path	Direct Effect	Indirect Effect	Total Effect
Entrepreneurial Characteristics → Business Performance	0.398	-	-
Entrepreneurial Characteristics → Credit Access	0.217	0.197	0.414
Business Performance → Credit Access	0.494	-	-

Based on Table 4, it can be summarized that through business performance as a mediating variable, there is strong effect of entrepreneurial characteristics to credit access. The role of entrepreneurial characteristics in credit access through business performance increases from 0.217 to 0.414. It proves that business performance acts as mediating variable. The result of this analysis provides empirical evidence that business performance acts as mediating factor of entrepreneurial characteristics with credit access.

Conclusion

The discussion of previous studies tend to argue that access to credit affects the business performance. Meanwhile, this study seeks to offer a new perspective and provides empirical evidence. The study also suggests that entrepreneurial characteristics of small business enhances the business performance. Therefore, a small business expects to have greater accessibility in obtaining bank loan through its business performance; thus, it should improve its entrepreneurial characteristic attributes. The relationships between entrepreneurial characteristics, business performance and access credit may provide a guidance how small business should have greater accessibility to bank credit by improving demography characteristics and supporting entrepreneurial orientation. In this case, the entrepreneurial characteristics can be used as predictors of credit access through partial mediation of the small business' performance. Entrepreneurial characteristics more strongly affects credit access through business performance compared to its direct influences on the access to credit.

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Teti CHANDRAYANTI is a Ph.D. student in the Faculty of Economics and Business, Universitas Padjadjaran, Bandung, Indonesia. She holds a master degree in business administration from Curtin University of Technology Perth-West Australia and her particular research interest in the area of micro, small and medium business (MSMEs).

ORCID ID: orcid.org/0000-0002-6190-2273

Sulaeman Rahman NIDAR is an Associate Professor in the Faculty of Economics and Business, Universitas Padjadjaran, Bandung, Indonesia. He holds a Ph.D. degree in Management from Universitas Padjadjaran and his particular research in financial management.

ORCID ID: orcid.org/0000-0002-9780-2012

Asep MULYANA is an Associate Professor in the Faculty of Economics and Business, Universitas Padjadjaran, Bandung, Indonesia. His master degree was taken from Diploma Kooperation Ekonomen (MCE) Philipps University Marburg Germany. He holds a Ph.D degree from Institut Pertanian Bogor and his particular research in Cooperative Management and Small-Medium Business.

ORCID ID: orcid.org/0000-0002-1661-2103

Mokhamad ANWAR is an Associate Professor in the Faculty of Economics and Business, Universitas Padjadjaran, Bandung, Indonesia. He holds a Ph.D. degree from the University of Leicester, England and his particular research in corporate finance & banking management.

ORCID ID: orcid.org/0000-0003-2641-7667

Register for an ORCID ID:

<https://orcid.org/register>

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THE ANALYSIS OF THE COMPARATIVE EFFICIENCY OF STATE SUPPORT FOR NATURAL GAS PRODUCTION: THE CASE OF SOME OECD AND BRICS COUNTRIES

Alan Karaev ¹, Vadim Ponkratov ^{2*}, Andrey Masterov ³, Andrey Pozdnyaev ⁴, Nikolay Kuznetsov ⁵

^{1,2,3} *Financial University under the Government of the Russian Federation, Moscow, Russian Federation*

⁴*Bauman Moscow State Technical University, Moscow, Russian Federation*

⁵*State University of Management, Moscow, Russian Federation*

E-mail: *ponkratovvadim@yandex.ru (Corresponding author)

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Abstract. Energy subsidies stimulate excessive energy consumption, accelerate the depletion of natural resources, and reduce incentives for investment in green energy and renewable energy sources. In response to these factors, in 2009, the G-20 countries agreed to phase out fossil fuel subsidies. Subsidizing fossil fuels has significant economic consequences, such as creating artificial incentives for the development of traditional energy sectors, leading to unequal distribution of benefits from the development of natural resources among the population, as well as further burdening the state budget. In this research, the DEA method (Data Envelopment Analysis) is applied for a comparative cross-country analysis of the efficiency of government support for natural gas production in seven countries – the leading producers in the world – for the period 2013–2018; this comprised of four OECD countries with developed economies (USA, Canada, Norway, and Australia) and three BRICS countries with developing economies and emerging markets (China, Brazil, and Russia). An extended version of the DEA method allowed us to evaluate not only the technical efficiency but also the price efficiency of budget support for natural gas production in the considered countries. The data for the empirical model characterizing the extent of financial support extended to natural gas producers through budgetary transfers and tax expenditures were retrieved from the OECD statistics database. The obtained results indicate the low efficiency of state support for natural gas production in Russia. The Russian government's policy is not directly aimed at an extensive development of the oil and gas sectors. Furthermore, urgent measures should be adopted to end inefficient energy subsidies that stimulate wasteful consumption of non-renewable raw materials and fossil fuels—an obligation for all G20 members. The economic and financial implications of ending fossil fuel subsidies should be comprehensively explored. In this regard, DEA models for evaluating the relative efficiency of state support for energy subsidies can be used as a powerful tool for solving a complex and crucial task of reforming the country's energy policy in line with global climate goals.

Keywords: subsidies; government support; fiscal measures; energy subsidies; natural gas production; operational environment; operational efficiency; DEA method

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1. Introduction

The most common argument in favor of energy subsidies revolves around the possibility of developing the industry and agriculture, creating jobs, providing access to energy services, and reducing poverty (IEA, 2015).

However, expected preferences carry significant state expenditures. At the same time, energy subsidies reduce the potential of national economies to grow, and contribute to the inefficient use of raw materials and energy resources. Subsidizing fossil fuels triggers the excessive consumption of these materials and resources and hinders the development of renewable energy sources (Stiglitz et al., 2017), which often leads to increased emissions of carbon dioxide and other greenhouse gases; that is, it is harmful to the environment (Grigoriev and Kurdin, 2014).

An IMF report (2019) presented data on energy subsidies in 191 countries. According to this report, government subsidies for fossil fuels are still significant; for instance, in 2015 their total amount was USD 4.7 trillion, or 6.3% of the world GDP. China spent the most (USD 1.4 trillion), followed by the United States (USD 649 billion), Russia (USD 551 billion), the European Union (USD 289 billion), and India (USD 209 billion). According to IMF forecasts, energy subsidies will remain high in 2020, and this figure will increase globally up to USD 5.8 trillion, or 6.7% of the GDP.

Various international environmental funds, led by the IMF, support the reduction of energy subsidies and believe that their funding is expensive for the country and may impede government efforts to reduce budget deficits. Subsidies also contribute to excessive energy consumption, accelerating the depletion of natural resources and reducing incentives for investments in other nonpolluting energy sectors.

As early as 2009, the G20 had called for the phasing out of fossil fuel subsidies worldwide and had reiterated this call in 2012. In line with the recent activities of the G20, the following criteria for classifying energy subsidies seem particularly relevant: the type of subsidized energy source (fossil fuel or other types of energy carriers) and the efficiency of subsidies.

In this research, we performed a cross-country analysis of the comparative efficiency of energy subsidies, in particular, government support for natural gas production in the OECD countries with developed economies (the USA, Canada, Norway, and Australia) and some developing BRICS countries (China, Brazil, and Russia) for the period from 2013 to 2018.

Actually, the OECD has developed a number of methods to evaluate the scale of financial support for a producer and a consumer through energy subsidies, even with limited data.

The OECD documents often use the term “government support measures” for the broadest interpretation of subsidies in the fuel and energy complex.

In this research, the comparative efficiency of state support for natural gas production was analyzed using the OECD methodology for subsidies evaluation – the OECD Inventory of Support Measures for Fossil Fuels (hereinafter referred to as the Inventory) that provide preferences to both consumers and producers of fossil fuels. In total, the Inventory includes 44 countries: 36 OECD countries and 8 partner countries (Argentina, Brazil, China, Colombia, India, Indonesia, Russia, and South Africa), and it reports about nearly 1,200 individual fossil fuel support measures in these states (OECD, 2019).

According to the Inventory, in 2017 the OECD member and partner countries provided about USD 140 billion for support of fossil fuels, which is 40% below the highest level of 2013. The total government support in OECD

countries and individual partner countries decreased by 9% between 2016 and 2017, which is smaller than a decrease of 12% that took place between 2015 and 2016, and a 19% decrease between 2014 and 2015.

2. Methodology

The efficiency of state power and its governing bodies can be increased by developing formalized methods and criteria for quantifying the efficiency of the entire public sector (Onrubia-Fernández and Jesús Sánchez Fuentes, 2017). Currently, the most common tool for evaluating the efficiency of the state activities is non-parametric methods for analyzing the operational environment (Data Envelopment Analysis, DEA (Emrouznejad et al., 2008)), in which the state consumes the resources of society and produces public goods (safety, health, infrastructure, etc.) (Akhremenko, 2013a).

However, the process of converting resources into results is not considered within the DEA method, i.e. the system is represented as a “black box”, efficiency is determined as a ratio of costs and results, but is not based on the internal characteristics of Decision-Making Units (DMUs). Therefore, this approach does not focus on the structure of the analyzed systems, and one can comprehensively explore their characteristics.

In the quantitative evaluation of the efficiency of the public sector, as a rule, one takes budget expenditures for providing various public goods as input variables, whereas the achieved level of public welfare in a particular area is considered as an output parameter of the model.

The method of Data Envelopment Analysis. A nonparametric method for evaluating the technical efficiency of a set of similar companies was first developed by Farrell (1957). Later, this method was substantially developed in the works of Debreu (1951), Koopmans (1951), Forsund and Hjalmarsson (1974), Charnes et al. (1985), and Tone (2001).

Nevertheless, all traditional DEA models can be used to measure the technical efficiency of DMUs, but they cannot be applied for benchmarking and ranking DMUs, since for this one needs to know price efficiency of the compared DMUs.

To overcome the above disadvantages of traditional DEA methods, Khezrimotlagh et al. (2013) developed an approach that evaluates the efficiency of companies according to the ϵ -KAM method (Kourosh and Arash Method). It uniformly connects two concepts and provides estimates for calculating both technical and price efficiency.

In this research, we performed a cross-country analysis of the comparative efficiency of energy subsidies – in particular, government support for natural production in seven countries, the leading producers of natural gas: four OECD countries with developed economies (the USA, Canada, Norway, and Australia) and three developing BRICS countries (China, Brazil, and Russia) for the period from 2013 to 2018 with the ϵ -KAM method.

The DEA method uses simultaneous input and output indicators, which sometimes leads to incorrect results because budget investment flows precede the results, but do not occur at the same time. Therefore, in this study we replaced budget investment flow with accumulated budget investments (Akhremenko, 2013). For example, considering the data for 2010–2013, the input indicator of the model will be the sum of $X(2010) + X(2011) + X(2012)$, and the output indicator will be $Y(2013)$.

3. Initial data for the analysis of state support efficiency

In the empirical model, the cross-country analysis of the comparative efficiency of state support for natural gas production was performed for a sample of seven countries: four OECD countries (the USA, Canada, Norway, and Australia) and three BRICS countries (China, Brazil, and Russia). The initial data covered the period from 2013 to 2018 and were taken from the statistical databases of the Organization for Economic Co-operation and Development (OECD).

We selected the following annual indicators for each country in the sample:

X1 – annual budgetary transfers to natural gas producers, million units in national currency;

X2 – annual tax expenditures for natural gas producers, million units in national currency;

Y1 – annual production of natural gas, million tons.

To recalculate government support indicators X1 and X2 that were expressed in the national currency of each country as a share of the country's GDP, we used annual data on the countries' GDP from the statistical database of the international organization—OECD Data, Gross Domestic Product (GDP).

Table 1 presents data on the world's annual production of natural gas (billion cubic meters), including country unions – OECD, BRICS, G7, Europe, and the European Union; some OECD countries – the USA, Canada, Norway, and Australia; and some BRICS countries – China, Brazil, and Russia for the period from 2010 to 2018.

As can be seen from Table 1, over the period from 2010 to 2017 the production of natural was steadily increasing worldwide, for instance, in the OECD, BRICS, G7, except for Europe and the European Union.

The most significant growth in natural gas production between 2000 and 2018 occurred in the USA (average annual growth of 2.6%), Norway (4.8% per year), Brazil (6.8% per year), Australia (7.7% per year), and China (10.4% in year).

Table 1. Natural gas production in some OECD countries (USA, Canada, Norway, and Australia) and the BRICS (Russia, Brazil, and China), billion cubic meters, 2010-2018.

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2000 - 2018 (%/year)
World	3280	3369	3423	3492	3541	3590	3628	3781	3975	2,6
OECD	1185	1206	1230	1238	1277	1305	1319	1363	1454	1,5
G7	850	882	902	902	956	991	989	1014	1108	1,3
BRICS	821	843	829	852	833	829	837	901	957	2,3
Europe	317	292	294	287	269	261	259	260	240	-1,6
European Union	206	185	174	173	155	139	138	131	112	-4,7
Norway	110	106	119	113	113	121	121	128	127	4,9
Russia	657	673	658	675	647	638	644	694	741	1,4
Canada	160	160	156	156	164	165	174	181	188	0,2
United States	604	649	681	686	733	767	755	775	864	2,6
Brazil	15	17	19	21	23	23	24	26	23	6,8
China	96	105	111	121	130	135	137	148	160	10,4
Australia	53	56	54	62	63	67	87	109	125	7,7

Source: Global Energy Statistical Yearbook 2019 (GESY, 2019)

Table 2 shows numerical values of state (fiscal) support for natural gas production in some OECD countries with developed economies (the USA, Canada, Norway, and Australia) and the BRICS countries (China, Brazil, and Russia) for 2010–2018. The amount of subsidies is given in the national currency of the country (million units). The last column of Table 2 presents the data on the GDP of the considered countries (million units of the national currency).

Table 2. State support for natural gas production in some OECD countries (the USA, Canada, Norway, and Australia) and the BRICS (China, Brazil, and Russia), 2010-2018

Indicators	X1–Fossil fuel subsidies, Budgetary Transfers, mln units	X2–Fossil fuel subsidies, Tax Expenditure, mln units	Y1– Production (annual) of Natural Gas, Bln cubic	GDP, in National Currency, mln units
2010,USA	49.1582	1126.4	604.	1.49921*10 ⁷
2011,USA	134.818	1090.9	649.	1.55426*10 ⁷
2012,USA	76.283	1087.46	681.	1.6197*10 ⁷
2013,USA	20.8615	1022.13	686.	1.67849*10 ⁷
2014,USA	19.3448	847.925	733.	1.75217*10 ⁷
2015,USA	0.0	1163.29	767.	1.82193*10 ⁷
2016,USA	0.0	903.86	755.	1.87072*10 ⁷
2017,USA	0.0	441.418	775.	1.94854*10 ⁷
2010,CAN	0.0	1398.49	160.	1.66213*10 ⁶
2011,CAN	0.0	557.55	160.	1.76992*10 ⁶
2012,CAN	0.0	696.262	156.	1.82281*10 ⁶
2013,CAN	0.0	937.587	156.	1.89753*10 ⁶
2014,CAN	0.0	1166.08	164.	1.99018*10 ⁶
2015,CAN	0.0	672.162	165.	1.98583*10 ⁶
2016,CAN	0.0	752.544	174.	2.02382*10 ⁶

2017,CAN	0.0	864.808	181.	2.13753*10 ⁶
2010,NOR	0	34.9049	110.	2.59374*10 ⁶
2011,NOR	0.	29.8241	106.	2.79576*10 ⁶
2012,NOR	0.	21.8834	119.	2.96826*10 ⁶
2013,NOR	0.	40.7446	113.	3.07558*10 ⁶
2014,NOR	0.	45.1141	113.	3.14667*10 ⁶
2015,NOR	0.	43.4124	121.	3.11812*10 ⁶
2016,NOR	0.	54.4323	121.	3.1193*10 ⁶
2017,NOR	0.	65.3188	128.	3.30444*10 ⁶
2010,AUS	0.0	0.853524	53.	1.36316*10 ⁶
2011,AUS	0.0	0.201326	56.	1.46749*10 ⁶
2012,AUS	0.0	0.202808	54.	1.51529*10 ⁶
2013,AUS	0.0	0.220175	62.	1.56812*10 ⁶
2014,AUS	0.0	0.223768	63.	1.614*10 ⁶
2015,AUS	0.0	0.229257	67.	1.6408*10 ⁶
2016,AUS	0.0	0.229257	87.	1.70525*10 ⁶
2017,AUS	0.0	0.22	109.	1.80793*10 ⁶
2010,CHN	924.201	3855.47	96.	4.12119*10 ⁷
2011,CHN	1297.47	6802.6	105.	4.8794*10 ⁷
2012,CHN	1389.89	9759.08	111.	5.3858*10 ⁷
2013,CHN	1621.35	11138.5	121.	5.92963*10 ⁷
2014,CHN	2243.33	9750.75	130.	6.41281*10 ⁷
2015,CHN	3703.46	7811.84	135.	6.85993*10 ⁷
2016,CHN	5158.18	5829.08	137.	7.40061*10 ⁷
2017,CHN	6248.17	9973.88	148.	8.20754*10 ⁷
2010,BRA	3.74378	120.	15.	3.88585*10 ⁶
2011,BRA	5.11545	185.842	17.	4.37638*10 ⁶
2012,BRA	2.86141	405.168	19.	4.81476*10 ⁶
2013,BRA	4.21879	164.192	21.	5.33162*10 ⁶
2014,BRA	3.2925	28.5536	23.	5.77895*10 ⁶
2015,BRA	1.44321	57.1927	23.	5.99579*10 ⁶
2016,BRA	0.300079	42.7873	24.	6.26721*10 ⁶
2017,BRA	0.254052	24.456	26.	6.55384*10 ⁶
2010,RUS	4560.41	6485.88	657.	4.98791*10 ⁷
2011,RUS	4492.47	8326.94	673.	6.02825*10 ⁷
2012,RUS	6528.45	8966.89	658.	6.81639*10 ⁷
2013,RUS	7981.78	8892.75	675.	7.31339*10 ⁷
2014,RUS	3753.86	8017.3	647.	7.91997*10 ⁷
2015,RUS	3595.76	4458.49	638.	8.32326*10 ⁷
2016,RUS	4049.49	3504.41	644.	8.60436*10 ⁷
2017,RUS	5403.26	5037.07	694.	9.21013*10 ⁷

Source: the authors' calculations with the data from Global Energy Statistical Yearbook 2019 (GESY, 2019) and OECD Inventory of Support Measures for Fossil Fuels database (OECD, 2019)

As can be seen from Table 2, most OECD countries producing natural gas (Canada, Norway, Australia, and partially the USA (since 2015) do not support the production of natural gas in the form of direct budgetary transfers: these subsidies are granted in the form of tax preferences.

4. The results of the analysis of state support efficiency

Table 3 presents the results of the model experiments with the ϵ -KAM method within the cross-country analysis of the comparative efficiency of government support for natural gas production or energy subsidies efficiency in some OECD countries (the USA, Canada, Norway, and Australia), and in the BRICS (China, Brazil, and Russia) for the period from 2013 to 2018.

As follows from Table 3, the OECD countries – natural gas producers with developed economies (the USA, Australia, and Canada) have the highest technical and price efficiency of state support (numerically expressed in units of the country's GDP) for natural gas production in the analyzed sample: in 2018 state support for natural gas production in these countries was on the borderline of technical and price efficiency (KAM-score=1.0). This, according to the ϵ -KAM method, means that there is no need to change the combination of input and output indicators of the model.

For the period from 2013 to 2018, in the analyzed countries the average values of the technical and price efficiency of state support (numerically expressed in units of the country's GDP) of natural gas production were highest in the OECD countries (the USA, Canada, and Australia). The USA had the highest price efficiency of state support for natural gas production averaged for the period from 2013 to 2018, while Australia had the highest technical efficiency averaged over the same period.

The developing BRICS countries, China and Brazil had the lowest indicators of both technical and price efficiency of state support for natural gas production (numerically expressed in units of the country's GDP) among the analyzed seven countries.

According to Table 3, in 2018 Russia had rather low values of both technical and price efficiency of state support for natural gas production (numerically expressed in units of the country's GDP) among the analyzed seven countries (KAM-score=0.389, $\epsilon=10^{-7}$ and KAM-score=0.410, $\epsilon=1.0$), which are very far from the borderline and the technical and price efficiency of state support for natural gas producers in the analyzed countries.

In terms of both technical and price efficiency of state support for natural gas production (numerically expressed in units of the country's GDP) for the period from 2013 to 2018, Russia's indicators were comparable to those of Norway, although Russia had slightly higher values than this country.

Table 3. Indicators of the efficiency of state support for natural gas production in the USA, Canada, Norway, Australia, and the BRICS (China, Brazil, and Russia), 2010-2018

Efficiency Indicators	KAM-score $\epsilon=10^{-7}$, Technical efficiency	KAM-score, $\epsilon=10^{-1}$	KAM-score $\epsilon=1.0$. Price efficiency
2013,USA	0.252	0.401	0.53
2014,USA	0.289	0.38	0.59
2015,USA	0.34	0.44	0.68
2016,USA	0.42	0.64	0.804
2017,USA	0.58	0.721	0.863
2018,USA	1.	1.	1.
Mean(2013-2018),USA	0.480	0.597	0.745
2013,CAN	0.250	0.258	0.262
2014,CAN	0.279	0.28	0.290
2015,CAN	0.304	0.304	0.308
2016,CAN	0.382	0.4	0.404
2017,CAN	0.48	0.521	0.563
2018,CAN	1.	0.898	0.886
Mean(2013-2018),CAN	0.449	0.460	0.471
2013,NOR	0.2016	0.204	0.2048
2014,NOR	0.2023	0.2058	0.2060
2015,NOR	0.2043	0.2062	0.2079
2016,NOR	0.2044	0.2072	0.2082

2017,NOR	0.205	0.2082	0.2094
2018,NOR	0.2055	0.2096	0.2098
Mean(2013-2018),NOR	0.204	0.207	0.208
2013,AUS	0.318	0.38	0.43
2014,AUS	0.465	0.465	0.465
2015,AUS	0.501	0.5	0.5
2016,AUS	0.655	0.687	0.688
2017,AUS	0.738	0.783	0.787
2018,AUS	1.	0.843	0.832.
Mean(2013-2018),AUS	0.612	0.635	0.645
2013,CHN	0.1022	0.1022	0.1022
2014,CHN	0.102	0.102	0.102
2015,CHN	0.102	0.1019	0.1019
2016,CHN	0.1023	0.1024	0.1024
2017,CHN	0.1033	0.1035	0.1035
2018,CHN	0.104	0.1041	0.1041
Mean(2013-2018),CHN	0.103	0.103	0.103
2013,BRA	0.11	0.112	0.112
2014,BRA	0.111	0.112	0.113
2015,BRA	0.115	0.116	0.116
2016,BRA	0.133	0.134	0.134
2017,BRA	0.155	0.156	0.156
2018,BRA	0.152	0.153	0.154
Mean(2013-2018),BRA	0.129	0.130	0.130
2013,RUS	0.232	0.267	0.255
2014,RUS	0.229	0.232	0.245
2015,RUS	0.24	0.244	0.258
2016,RUS	0.2681	0.283	0.296
2017,RUS	0.277	0.287	0.328
2018,RUS	0.389	0.392	0.41
Mean(2013-2018),RUS	0.273	0.284	0.299

Source: compiled by the authors, the calculations performed according to the proposed methodology using the data from Tables 1 and 2.

Thus, according to the conducted research on the comparative efficiency of state support for natural gas production (expressed in units of the country's GDP), in several OECD developed economies (the USA, Canada, Norway, and Australia) and some BRICS emerging economies (China, Brazil, and Russia), over the period from 2013 to 2018 Russia had lower efficiency than the OECD countries with developed economies (the USA, Canada, and Australia), which means that Russia's state support for energy subsidies should be reformed.

A valuable example for Russia in reforming the state support for energy subsidies is more than a century of US experience in regulating subsoil use (Atnashev, 2016) and removing a number of barriers that impede the natural development of this business. The main factor that differentiates the United States from other mining countries is the minimal regulation of subsoil use and competitive structure of the industry, where hundreds of small and medium-sized companies compete with leaders, constantly testing new technological ideas. In addition to the minimal regulation pertaining to subsoil use, the country needs an effective financial market and investments protection. Due to these factors, the innovation experience gained during the last decade has allowed the United States to significantly transform this industry and to double hydrocarbon production.

Even during the periods of relatively low oil prices, Russia could increase investments and technological growth in this sector if it deregulated subsoil use and opened the oil and gas industry to private investment.

Russian oil, gas and chemical industries are the areas that require more efficient state support. Although Russia is one of the leading oil and gas producers with significant hydrocarbon reserves, the oil and gas chemical industry, which could effectively monetize this strategic advantage, represents only 1.5% of the Russian economy. Pyrolysis plants, the foundation of the Russian petrochemical industry, were built in the second half of the 20th century, and have since only been modernized and expanded (VYGON, 2017).

In 2012, the Ministry of Energy of the Russian Federation approved the Development Plan for the Russian Gas and Petrochemical Industry that would be in effect until 2030 (hereinafter referred to as the Plan–2030). The strategy proposed as a part of the Plan includes building six bespoke large gas and petrochemical conglomerate clusters in order to solve one of the key structural tasks – to facilitate the development of petrochemical production. Each cluster is envisaged to contain a complete production chain – from hydrocarbon extraction to the production of final consumer goods. Such a development strategy was chosen due to the successful international experience with similar initiatives.

The strategy chosen within the Plan–2030 that entails creating such clusters is the best solution for the development of the petrochemical industry in Russia. The government will play an active role in the implementation of this approach, as it will provide benefits and subsidies to newly created enterprises. Most importantly, it will participate in constructing the infrastructure for future clusters, as well as provide them with raw materials.

This measure aimed at increasing the efficiency of state support for energy subsidies in Russia will ensure the diversification of the Russian economy due to the increased economic complexity index (ECI) (Hausmann and Hidalgo, 2009). Empirical evidence indicates that economic development necessitates the implementation of more complex methods of production, which would typically yield higher value added per an employee (van der Ploeg et al., 2017).

These assertions are based on the fact that complex products require a wider range of skilled workers, related industries, and inclusive institutions that make these products economically competitive. Conversely, simple products and activities related to resource utilization are mainly associated with resource intensity, low labor costs, routine activities, and economies of scale.

The directed development and support of the petrochemical industry requires an integrated approach that would cover the entire chain, from the extraction of raw materials to the creation of final products. The system of state subsidies should be aimed at solving specific state problems (for example, construction of pyrolysis plants and transport infrastructure). It should comply with the development strategy of the related industries, without creating artificial imbalances when stimulating the development of production depending on the type of raw materials (VYGON, 2017).

Low efficiency of state support for energy subsidies in Russia has been noted in other studies. For instance, Gerasimchuk (2012), Lunden and Fiertoft (2014) analyzed in detail the size and efficiency of government subsidies to the Russian oil and gas sector and identified more than 30 federal subsidy schemes for oil and gas producers in Russia that were in place in the 2009–2010 period.

Lunden and Fiertoft (2014) further noted that 17 of these 30 schemes amounted for USD 8.1 billion in 2009 and USD 14.4 billion in 2010, equivalent to 4.2% and 6.0% of the total value of oil and gas production in Russia in 2009 and 2010, respectively.

Moreover, Gerasimchuk (2012) found that subsidies were provided in the form of direct support (targeted budget financing, state lending on concessional terms, etc.), or in an indirect form, for example, when the government

recovered the damage due to industrial accidents or provided concessional conditions for oil and gas companies to use state-owned infrastructure.

The study “State Support for Oil and Gas Production in Russia. A Subsidizing Role in the Development of Projects of “Yamal LNG” and “Prirazlomnoye” (Lunden and Fiertoft, 2014) provided substantial evidence that government support for the Yamal LNG and Prirazlomnoye projects was inefficient and unprofitable, and the net social benefits from their implementation are doubtful. The researchers found that after paying taxes, both projects would be unprofitable under the current Russian tax system (when it is not profit, but income that is taxed). However, “corrective” tax benefits and other state support measures do not follow the system criteria, but are applied to “status” projects. According to the authors of the study, “the status is determined according to criteria that are not always clearly stated. Although the government reserves the right to select favorite projects, there is no guarantee that other projects that could bring more revenues to the Russian state will not be overlooked” (Gerasimchuk, 2012).

The conclusions of this paper, as well as the results of the studies (Gerasimchuk, 2012; Lunden and Fiertoft, 2014), prove the poor quality of Russian state administration and institutions as they are incapable of pursuing an effective budget and energy policy. There is an urgent need to reform energy subsidies, to create a single mechanism for monitoring and evaluating the funding of subsidies on fossil fuels according to the set objectives and with special focus on their social and environmental impacts.

Conclusions

The research findings of cross-country (the USA, Canada, Norway, Australia, China, Brazil, and Russia) analysis of the comparative efficiency of state support for natural gas production in 2013–2018 indicate the low result of Russia. In practice, the Russian state policy does not provide for the intense development of the oil and gas sector. Urgent measures should be taken to end inefficient energy subsidies that stimulate wasteful consumption of non-renewable raw materials and fossil fuels, which will correspond to Russia’s obligations as a member of the G20.

Comprehensive research should be conducted on the economic and financial implications of ending fossil fuel subsidies. In this regard, DEA models for evaluating the relative efficiency of government support for energy subsidies can be a powerful tool to support governments in the complex and crucial task of reforming their energy policies in line with global climate goals.

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Alan Kanamatovich KARAEV is a Doctor of Sciences (Engineering), Professor, Senior Staff Scientist of the Financial Policy Center of the Public Finance Department, Financial University under the Government of the Russian Federation. Scientific specialty: the problems of coordinating strategic, macroeconomic, and budget forecasting; studying the problems of interaction between the state, financial, and real sectors of the national economy; assessing the stability of the budget system of the national economy based on the development of computational methods and computer modelling methods for non-linear behaviour of financial and economic systems and processes.

ORCID ID: <https://orcid.org/0000-0002-5120-7816>

Vadim Vitalievich PONKRATOV is a Candidate of Sciences (Economics), Director of the Financial Policy Center of the Public Finance Department, Financial University under the Government of the Russian Federation. Scientific specialty: state financial policy, evaluation of its effectiveness; management of oil and gas budget revenues, strategies for the formation and use of sovereign funds resources; natural rent and instruments of its withdrawal; tools of state financial incentives foreconomic development.

ORCID ID: <https://orcid.org/0000-0001-7706-5011>

Andrey Igorevich MASTEROV is a Candidate of Sciences (Economics), Leading Research Scientist of the Financial Policy Center of the Public Finance Department, Financial University under the Government of the Russian Federation. Scientific specialty: enhancing the management of sovereign wealth funds; improving the quality of budget planning and forecasting using program-targeted approaches; study of budget tools to stimulate economic growth, import substitution and export.

ORCID ID: <https://orcid.org/0000-0002-5531-1047>

Andrey Sergeevich POZDNYAEV is a Doctor of Sciences (Economics), Leading Researcher of the Research Institute of Special Engineering, Bauman Moscow State Technical University. Scientific specialty: national tax systems, fiscal policy, verification of economic indicators and quantitative methods of analysis.

ORCID ID: <https://orcid.org/0000-0003-4038-6609>

Nikolay Vladimirovich KUZNETSOV is a Doctor of Sciences (Economics), Candidate of Sciences (Engineering), Director of the Economics and Finance Institute of the State University of Management. Scientific specialty: building systems of financial and economic management of enterprises; financial and strategic management, financial analysis, economic and mathematical modeling and forecasting.

ORCID ID: <https://orcid.org/0000-0001-9897-1531>

Register for an ORCID ID:

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EVALUATING INNOVATION-DRIVEN ECONOMIC GROWTH: A CASE OF JORDAN

Ahmad Fathi Alheet¹, Yacoub Hamdan²

^{1,2} Al-Ahliyya Amman University, Post office – zipcode 19328, Amman, Jordan

E-mails: ¹ a.alheet@ammanu.edu.jo; ² y.hamdan@ammanu.edu.jo

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Abstract: The aim of the research was to examine the role of innovation in promoting economic growth in Jordan. Innovation is a key factor for businesses and a significant element of growth. However, in the case of promoting economic growth, its significance differs in terms of region and countries. To explore the innovation-growth link, the study adopted a quantitative approach, using Jordan's macroeconomic data of 18 years (2000-2017). The data was collected from secondary sources using the World Bank database. It was found in the research that the progress in Jordan in relation to technology and innovation does not contribute to GDP growth. Internet penetration in Jordan increased, but GDP saw a persistent decline. However, patent applications (non-residents) has a significant impact on reducing unemployment in the country. Thus, it is recommended to focus more on innovation in the form of promoting patents to reduce unemployment and propel growth in the country.

Keywords: innovation; economic growth; patent applications; Internet; unemployment; Jordan

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1. Introduction

The modern contemporary society is witnessing increasingly changing cultural, social, political and economic developments and above all innovation, which is largely becoming widespread in businesses around the world. As a result, the field of innovation is now an emerging area with the publication of numerous leading works. Businesses in the present technological society are likely to become more innovative particularly at the global level (Thomas et. al., 2011, Prodani et al., 2019; Orynbassarova et al., 2019). It is discussed by Pece, Simona and Salisteanu (2015) that the growth of information technology signifies the premises for the improvement in the financial performance of the organisation and for economic growth and development. It is observed that technology and innovation, and increasing expenditures on research and development (R&D) are fundamentals for guaranteeing progress and competitiveness, which leads to sustainable economic growth.

The relation between innovation and economic growth presents increasing interest for scholars; as a consequence, the notion is well-debated and well-researched subject in the financial literature. It was Solow (1956), who originated this concept of research and mentioned the existence of a strong association between innovation and

economic growth. On the other hand, an Australian political economist Joseph Schumpeter makes the peculiarity between economic development and economic growth. Hence, on the basis of his viewpoint, economic growth signifies a progressive and slow transformation of the economic system, consequential from exogenous factors, whereas, the economic development is created by uneven internal changes resulted by economic innovations, originating from the economic system.

This research specifically emphasises on the question, does innovation promote economic growth? In relation to this, Jordan as a case is studied to assess how innovation promotes economic growth in Jordan. According to Jordan Times (2018), Jordan is a country with limited natural resources, and its economy is largely reliant on its ability to enhance products and services value and to develop and use its human capital. Over the years, a number of measures have been introduced by the Jordanian government to assist the development of its economy by increasing its ability and competitiveness new prospects using innovation. Sultan and Soete (2012) assert that the national information system (NIS) of Jordan is not working with full efficiency and it is still underdeveloped. The innovation system lacks synchronisation between its components and is weak. The key challenge faced by Jordan related to economic and sustainable development is weak relation between business institutes and education, low expenditure of R&D, less usage of ICT, limited innovation activities and private sector R&D, non-competitive industry, brain drain and few skilled experts.

According to the recent report of World Bank (2018), in order to create jobs for unemployed people and accelerate growth in the Middle East North African (MENA) Countries, it is important to focus on digital economy that utilises educated and young workforces. This will probably require the implementation of new and innovative technologies and facility of 'digital public goods' such as digital payment solutions and reliable and fast internet. Economic growth in the MENA region has recovered from 1.4 % in 2017 to 2.0% in the year 2018. The slight increase in regional growth shows a positive effect of stabilisation policies and reforms taken in many countries in relation to recent external oil demand and the rise in oil prices. It is projected that economic growth in MENA region will improve slightly, reaching 2.6% by the end of 2019-2020.

2. Literature Review

Innovation and its Significance in Business

Competition among organisations is a lot more different today as it used to be in the past. The organisations are competing domestically as well as globally, and are working to attain competitive advantage so that they can acquire a stable and better position in the market. Innovation is, therefore, the best way to attain a competitive advantage (e.g. Ramadani and Gerguri, 2011; Amraoui et al., 2019).

As per the report of OECD (2010), innovation is vital for economic development and sustainable growth. A number of essential conditions encourage economic growth and enable innovation. Innovation is significant in the modern economy for innovation processes, growth and employment and value creation that take place at organisational, domestic and regional level.

According to Costello and Prohaska (2013), innovation is originated from the Latin term 'innovare' which is viewed as 'into new'. In the simplest term, innovation is perceived as doing something unusual. It is a word that has become common in the world of business and for organisations it usually means something time consuming, costly and risky. Innovation can be elucidated as a new concept, novelty, device or product. It is a way of thinking, a mindset beyond the today and into the forthcoming. For organisations, innovation is significant and when applied correctly it can be a management technique, process and a strategy (Stenberg, 2017). Zhou (2015), assert that innovation at the basic stage can the process of collecting and relating idea to make an association between past experiences and existing accomplishments to address future problems. Usually this is related to

technological achievements and has a significant role to play in the global economy. Similarly, Daugherty, Chen and Ferrin (2011), explain innovation as a specific tool of entrepreneurs to make use of change for a different service or business. Furthermore, this innovation can be viewed as disciplined that can be practised and learned. To be specific, innovation is said to be an object, practice or an idea that is seen as new by businesses or by entrepreneurs (Zawawi, 2016).

Ionescu and Dumitru (2015) have argued in their study that innovation is the governing force behind the profitability, growth, creation of strong values and competitiveness. The organisation witnessing quick growth and success are the ones who have used innovative solutions in their daily activities, and it is specifically for this purpose that a significant ratio for their revenue is generated by improved or new products and services. In the contemporary global markets, only those organisations will survive who can introduce and implement innovation and those who are more efficient than their rivals (Reddy and Reddy, 2014). Urbancova (2013) highlights that still innovation is viewed as a significant force behind economic performance. It helps to attain competitive edge in different aspects. The most significant feature of innovation includes: new products improve profitability and aid maintain market share; a robust relationship between new products and market performance and innovative practices that lead to reducing time of production and speeding up product developed as compared to the competitors.

Theoretical Framework

A country's economy is viewed from different perspectives; similarly, New Growth Theory is an understanding of the economy that involves significant points. Firstly, it assesses technological development as an architect of economic activity. Secondly, it holds different technology, knowledge and physical objects categorised as increasing returns and these returns direct the growth process. Usually, this theory is titled as 'endogenous growth theory' as it incorporates technology to assess how market works (Capello and Nijkamp, 2010, p.355). According to Peet and Hartwick (2015, p.60), New Growth Theory assists in continuing the shift to knowledge-based economy from resource-based economy. It highlights that economic procedure which form and diffuse knowledge significant for shaping individual firms, communities and nations.

On the other hand, Gregersen and Johnson (1997) view that theory needs to incorporate the core concept that accumulation of capital results in technical change and this change gives encouragements for capital investments. Within the economy, there is a sector known as 'knowledge producing' which delivers new technology to other sectors. In addition, innovation is the outcome of deliberate efforts of organisations in an optimisation background. Technology is not an entirely exogenous public good; however, it is produced in the economy and has public and private aspects. In relation to innovation, Venuvinod (2011, p.202) assert that Gabriel Tarde, the French sociologies is said to be a great theorist of entrepreneurship and innovation. According to Sveiby, Gripenberg and Segercrantz (2012, p.62), Schumpeter made significant input to the research of the role of innovation in development. The significance of innovation has been highlighted by Schumpeter who wrote that, innovation exceptional point in the economic history, or in what is entirely economic in that history. Innovation is said to be the entire based of Schumpeter model of economic change.

There are many dissimilar viewpoints in the role of innovation and economic theory (Forssbaeck and Oxelheim, 2014, p.220). Innovation, as seen by some theorist, is a significant aspect, the foundation of the theory; however, there are scholars who do not view innovation to be significant in any way. Innovation as per some theories is an endogenous factor, and it is described as exogenous to the economy (Onyemelukwe, 2016, p.26). It is found that innovation has a significant role in the classical theories, however, a considerably less role is found in neoclassical theories (Eggink, 2013). As per Schumpeter, development and growth can occur when the economy is continuously troubled to an out-of-equilibrium level. Later, in a few neoclassical theories, growth is increased through a factor called innovation; however it was seen as an exogenous factor. Innovation as endogenous factor and new growth theories were advanced later, nevertheless these theories were grounded on the principle of

equilibrium. Innovation is treated as endogenous to the economy in the neo-Schumpeterian and Schumpeterian theories. Further, the role of Schumpeter in contributing to theories related to economic development and through increasing attentiveness of the innovation role in these theories is of immensely significant. The input of Schumpeter has brought momentous change in the way how economic growth was perceived (Eggink, 2013).

Innovation and Economic Growth

In the past few years, policymakers and researchers have become more attentive to assess the relationship between entrepreneurship, innovation and regional outcomes (Wang, Ho and Autio, 2005; Howells 2005; Mitra, 2013, p.268; Galindo and Mendez-Picazo 2013; Tsvetkova 2015). Innovation is viewed as one of the significant aspects of the economy (Santacreu 2015; Bae and Yoo 2015; Andergassen, Nardini and Ricottilli, 2009), specifically since the influential work of Joseph Schumpeter, a political economist. According to Aghion et al. (2005), innovation affects the economy in different channels, i.e., global competitiveness, trade openness, infrastructure development, quality of life, financial system and high economic growth. The above-mentioned studies largely emphasise on the impact of innovation on economic growth, signifying the supply-drive method of innovation and growth relationship. Nevertheless, it is economic growth that in reality enhances the innovation level in the process of development. That indicates the possibility of bidirectional connectedness between innovation and economic growth (Pradhan et al. 2016; Maradana et al. 2017).

It is identified that innovation activities help to enhance economic growth directly through macroeconomic factors, i.e. interest rates, consumer confidence etc. (Van den Berg and Lewer, 2015, p.174; Furman, Porter and Stern, 2002). Nevertheless, it is likely that innovative practices and activities are equally impacted by macroeconomic factors and economic growth. Indicating that in practice, economic growth and innovation activities can cause each other in the process of development, and hence there is the likelihood of response relationship between the two (Hassan and Tucci, 2010). According to Torun and Cicekci (2007), Innovation is the core of the 21st-century economy, constantly driving different invigorating activities through the system. Hubbard, Garnett and Lewis (2012, p.373), assert that economic growth is usually measured by means of changes in the total value of goods and services an economy produces or what is recognised as GDP (gross domestic product). Certainly, as the size of countries differs so is their GDP growth, which offers a measure of well-being of individuals. According to the study of Gerguri and Ramandani (2010), a theoretical relationship between economic growth and innovation has envisaged as since as early as the 18th century by Adam Smith. The productivity gains have been articulated from specialisation via division of labour and also from technological improvements to processes and capital equipment.

Guan and Chen (2012) argue that innovation is largely accepted as a key reason for national economic growth in both developing economies and as well as developed economies. Furthermore, there is a general understanding among economist considering a significant and positive relationship between innovation and growth. Recent studies, i.e. Jainguo (2015), specify that a region or state's innovation policies can add to economic development. It is assumed that innovation activities have not any direct influence on economic productivity, however, economic growth is promoted via encouraging new business development, which promotes economic output and employment growth. On the other hand, Pece et al (2015), studied innovation and economic growth, considering the case of the ECE (Eastern Countries of Europe). It was found that innovation factors fail to influence the growth and to make a significant contribution to ECE. Even though economic growth in these countries is increasing rapidly, but the growth is not driven by innovation, rather innovation is still in an evolving phase.

Broughel and Thierer (2019) discussed that technological innovation is a key instrument behind human progress and economic growth. Economic historians, development economist and growth economists all seem to accept the significance of technological innovation in enhancing long-term economic growth. Certainly, a recent article published in The Economist magazine "*Economists Understand Little about the Causes of Growth*" nevertheless acknowledged that in some ways, growth is related to the use of technologies for becoming productive and for

discovering new ideas. Criscuolo (2008, p.33) studied that technological change is a key element of total factor productivity (TFP), and found that there is a proof that TFP has a significant part in accounting for the cross-country variation in patterns of economic growth and in income per worker. In contrast, supposedly, Çetin (2013) assert that innovation-based growth advocates that there exists a significant and position relationship between economic growth and innovation. In addition, research and development (R&D) have a significant role in raising productivity, innovation and enhance economic growth.

Hence, it can be said on the basis of above-mentioned studies, that innovation and economic growth are interrelated positively; however, limited investigation has been carried out on the role of innovation in promoting economic growth in the context of Jordan. As innovation is increasingly become prevalent and rapid adopted, it will surely be a key factor in increasing the economic growth rate of developing and developed economies in years to come.

3. Research Methodology

There are three different types of research approach, which include qualitative, quantitative and mixed-method approach. Each of these approaches is applied considering the objective and aim of the research. Concerning, the present study which assesses how innovation promotes economic growth, the researcher applies a quantitative research approach. The reason for applying this approach is to investigate innovation and economic growth using statistical, mathematical and computational techniques. In this approach, statistical software is used to analyse the data and present accurate findings (Luiz and Kun-huang, 2015, p.24).

The research design is a flow or strategy of the research which helps the investigator in performing different activities related to the research in a more systematic way. The investigator picks up the research design so that appropriate outcomes can be more understandable. There are dissimilar types of research designs applied in studies, which includes descriptive, correlation, experimental and review based (Kumar, 2019, p.94). In this research, a correlation design is used by the researcher concerning the aim of the study. Correlation design is helpful in finding a relationship between two or more variables (Morra Imas and Rist, 2009, 266). Hence the relationship between innovation and economic growth can be found using this design.

For data collection, the researcher uses secondary data sources, in which information is gathered from previous literature, databases, reports, and other sources (Naoum, 2012, p.49). In this research, data is acquired mainly from the World Bank online database, and literature is reviewed using earlier studies on the same subject. The sample size for the study is 18 years from 2000 to 2017. Further, the variable of the study includes economic growth, patent applications (resident and non-residents), unemployment level, internet penetration, and inflation.

Lastly, data analysis is the concluding phase of research. It interprets and assesses the gathered data by using statistical instruments. Further, there exist different techniques for analysing the data, but the nature of data determines what type of technique should be used. In the case of the present research, descriptive statistics, correlation and regression are used. Descriptive statistics are used in summarizing data which can be a representation of a population (Jackson, 2014, p. 262). The correlational technique can exhibit how strongly variable are interrelated with each other (Forte, 2015, p.240). While, regression analysis is helpful for assessing the impact of one variable over others (Dey, Bhatt, Ashour, 2018, p.104). These three analysis techniques are sufficient to analyse the data and present the results.

The proposed equations of the study are:

$$\text{GDPG} = \alpha + \beta_1 \text{PANR} + \beta_2 \text{PAR} + \beta_3 \text{INF} + \beta_4 \text{II} + e$$

GDPG	GDP growth
PANR	Patent applications (non-resident)
PAR	Patent applications (resident)
INF	Inflation
II	Individuals using the internet

$$\text{UNEMP} = \alpha + \beta_1 \text{PANR} + \beta_2 \text{PAR} + \beta_3 \text{INF} + \beta_4 \text{II} + e$$

UNEMP	Unemployment rate
PANR	Patent applications (non-resident)
PAR	Patent applications (resident)
INF	inflation
II	Individuals using the internet

Here, PANR, PAR, and II are used as innovation's proxies while GDPG and UNEMP show economic growth.

4. Results and Analysis

The objective of the current research study is to examine the impact of innovation on economic growth in Jordan. As mentioned earlier, innovation is measured by patent applications (resident and non-residents) and internet penetration, while economic growth is represented by GDP growth and unemployment.

Table 1. Descriptive Statistics

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Patent applications, non-residents	18	117.00	535.00	296.0556	139.36557
Patent applications, residents	18	21.00	75.00	44.5000	15.59129
GDP growth (annual %)	18	2.00	8.57	4.7306	2.41522
Unemployment, total (% of total labour force) (modelled ILO estimate)	18	11.90	15.30	13.6506	1.12381
Inflation, consumer prices (annual %)	18	-0.88	13.97	3.3267	3.39885
Individuals using the Internet (% of population)	18	2.62	66.79	28.0661	20.56497
Valid N (listwise)	18				

According to table 1, 296 patent applications (non-resident) are filed in Jordan on average during the 18-year period selected in this study (2000-2017), which a standard deviation of 139. However, the number of resident patent applications are relatively low on average (44). The country has recorded significant growth in the GDP during the period i.e. 4.73%, with an unemployment rate of 13.6% on average. This economic performance is comparatively better but inconsistent when compared to other states in the Middle East. Moreover, in terms of internet penetration, the individuals using the internet are 28% of the population on average, with a high standard deviation (20.5%), suggesting an increase in internet penetration over time.

Table 2. Correlation

Correlations							
		Patent applications, non-residents	Patent applications, residents	GDP growth (annual %)	Unemployment, total (% of total labour force) (modelled ILO estimate)	Inflation, consumer prices (annual %)	Individuals using the Internet (% of population)
Patent applications, non-residents	Pearson Correlation	1	0.385	0.075	-.722**	.539*	0.206
	Sig. (2-tailed)		0.115	0.768	0.001	0.021	0.413
	N	18	18	18	18	18	18
Patent applications, residents	Pearson Correlation	0.385	1	.478*	-0.333	0.209	-0.439
	Sig. (2-tailed)	0.115		0.045	0.176	0.406	0.068
	N	18	18	18	18	18	18
GDP growth (annual %)	Pearson Correlation	0.075	.478*	1	0.261	0.357	-.678**
	Sig. (2-tailed)	0.768	0.045		0.296	0.146	0.002
	N	18	18	18	18	18	18
Unemployment, total (% of total labour force) (modelled ILO estimate)	Pearson Correlation	-.722**	-0.333	0.261	1	-0.330	-0.218
	Sig. (2-tailed)	0.001	0.176	0.296		0.181	0.384
	N	18	18	18	18	18	18
Inflation, consumer prices (annual %)	Pearson Correlation	.539*	0.209	0.357	-0.330	1	-0.151
	Sig. (2-tailed)	0.021	0.406	0.146	0.181		0.549
	N	18	18	18	18	18	18
Individuals using the Internet (% of population)	Pearson Correlation	0.206	-0.439	-.678**	-0.218	-0.151	1
	Sig. (2-tailed)	0.413	0.068	0.002	0.384	0.549	
	N	18	18	18	18	18	18

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

The study examines the correlation between the given constructs in order to assess the nature and extent of the relationship. According to table 2, patent applications (non-residents) has a significant and strong correlation between unemployment and inflation only. Its association with unemployment is negative and positive with inflation. However, internet penetration has a significant but negative association with GDP growth. The negative association can be justified by the fact that internet use has grown during the period, while GDP growth has declined as shown in figure 1.

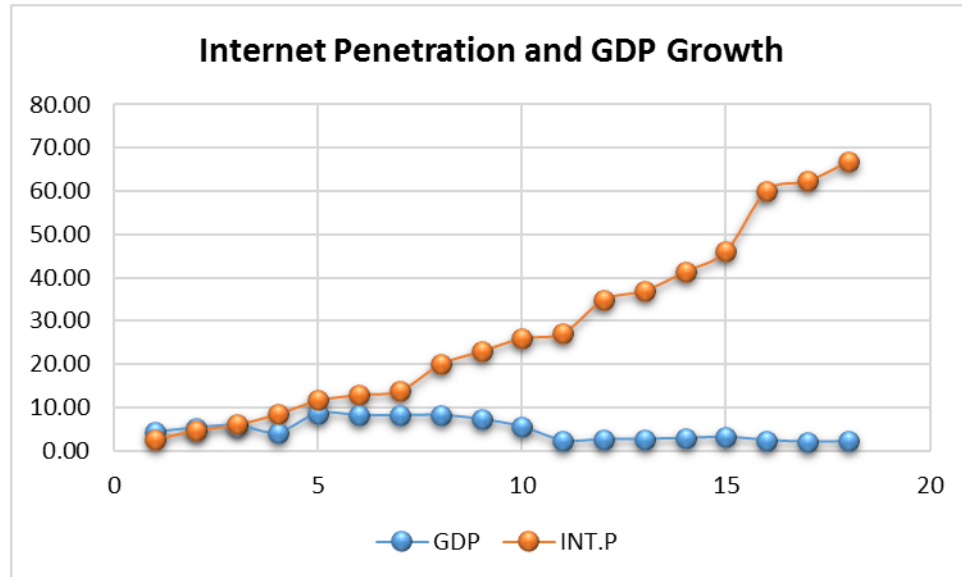


Figure 1. Internet Penetration and GDP Growth

In the following analysis, the paper performs a correlation, using unemployment as a proxy to economic growth. According to table 3, the overall multiple regression model where innovation predicts economic growth is statistically significant at the 0.05 level. It means the set of variables including Inflation, consumer prices (annual %), Individuals using the Internet (% of population), Patent applications, residents, Patent applications, non-residents significantly predict unemployment rate in Jordan.

Table 3. ANOVA

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	<u>Regression</u>	11.631	4	2.908	3.842	.028 ^b
	<u>Residual</u>	9.839	13	0.757		
	<u>Total</u>	21.470	17			

a. Dependent Variable: Unemployment, total (% of the total labour force) (modelled ILO estimate)

b. Predictors: (Constant), Inflation, consumer prices (annual %), Individuals using the Internet (% of the population), Patent applications, residents, Patent applications, non-residents

The overall model explains 54.2% of the variance in the dependent variable as revealed by the R-squared value, suggesting a good fit (Table 4).

Table 4. Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.736 ^a	0.542	0.401	0.86997

a. Predictors: (Constant), Inflation, consumer prices (annual %), Individuals using the Internet (% of the population), Patent applications, residents, Patent applications, non-residents

However, individually, only patent applications (non-residents) is significant in predicting the unemployment rate in the country (Table 5). The beta coefficient is negative, suggesting a negative relationship. The value of beta reveals that a unit increase in the number of patent applications reduces unemployment by 0.005%, which is very low. However, it is observed that progress in the country in terms of innovation and technology does contribute to economic growth.

Table 5. Coefficients

Coefficients					
Model	Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.
	B	Std. Error			
(Constant)	15.895	0.907		17.528	0.000
Patent applications, non-residents	-0.005	0.002	-0.645	-2.255	0.042
Patent applications, residents	-0.011	0.018	-0.157	-0.615	0.549
1 Individuals using the Internet (% of population)	-0.008	0.014	-0.150	-0.592	0.564
Inflation, consumer prices (annual %)	0.009	0.080	0.028	0.115	0.910
<i>a. Dependent Variable: Unemployment, total (% of the total labour force) (modelled ILO estimate)</i>					

Based on these findings it can be confirmed that some of the innovation proxies do have significant impact on the economic growth of the country. More precisely speaking, the patent applications non-resident, does impact the unemployment rate of the country i.e. contributes to economic growth. The findings suggest a focus on non-residents' patent application to propel innovation-led growth in the country. However, it is also important to promote and facilitate residents' patent applications, which are fewer in numbers when compared to non-residents.

4. Conclusion

The aim of this research was to see whether innovation promotes economic growth, considering the case of Jordan. A considerable number of studies has studied the link between innovation and economic growth. Innovation is an emerging phenomenon and is considered as a key element in enhancing productivity and growth. The study was quantitative in nature and collected data from the secondary sources, i.e. World Bank. It was found in the results that 296 patent applications (non-resident) are filed per year on average in Jordan during (2001-2017). Further, internet penetration in Jordan increased, but GDP growth saw a persistent decline. The patent application (non-resident) has a strong and significant correlation with inflation and unemployment. Its association with inflation is positive and negative with unemployment. Moreover, individually, the patent application (non-residents) is significant in reducing the rate of unemployment in Jordan. Therefore, it is suggested that Jordan must focus on growth in innovation and technology with an aim to reduce unemployment in the country.

However, the current study has certain limitations. The study results may not be generalized on a larger population or on similar economies since the sample size is limited to only 18 observations. Moreover, the study methodology also restricts the results to only statistical evidence. A more comprehensive study can be conducted in future using both quantitative and qualitative methodology with larger sample size and inclusion of both primary and secondary data.

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Ahmad Fathi ALHEET

ORCHID ID: <https://orcid.org/0000-0001-5781-1072>

Yacoub HAMDAN

ORCHID ID: <https://orcid.org/0000-0001-6887-954X>

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THE EFFECT OF CORPORATE GOVERNANCE STRUCTURE ON FINANCIAL DIFFICULTIES*

Wuryan Andayani ¹, Dalila Daud ^{2*}

¹Brawijaya University Malang Indonesia, JIMT Haryono No 165, Malang, Jawa Timur, 65300, Indonesia

²Accounting Research Institute (ARI) and Faculty of Accountancy, UiTM Cawangan Negeri Sembilan, 70300, Malaysia

E-mails:¹ andayani@ub.ac.id; ^{2*} daliladaud@uitm.edu.my (Corresponding author)

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Abstract. This study aims to examine the effect of Corporate Governance Structure (CG) and Corporate Social Responsibility (CSR) on Financial Difficulties. The contribution of this research is to explore the truth of CG goals and achieve quality CSR reporting and can provide solutions to conditions before and when companies experience financial difficulties and provide things that are considered important to anticipate the possibility of financial difficulties. CG in this study uses the size of the audit committee and independent commissioners, then CSR is measured by the quality of CSR disclosure. The data analysis method used is multiple linear regression. The results of this study are the audit committee has no effect on financial difficulties but the independent commissioner has a negative effect on financial difficulties. The contribution of the proportion of independent directors apparently contributed more to the proportion of the number of audit committees. The proportion of the audit committee is not able to minimize or even be a solutive effect on the financial difficulties of companies in Indonesia. The audit committee is a form of responsibility for compliance with government regulations only. The test results also support the influence of CSR on financial difficulties assuming that the quality of CSR disclosure has a significant negative effect on corporate financial difficulties. Disclosure and implementation of CSR activities can have an effect to minimize if in the future the company experiences financial difficulties, the guarantee of funds will remain well distributed so as to minimize the financial difficulties experienced by the company.

Keywords: quality; disclosure; corporate governance; corporate social responsibility; audit committee; independent commissioner

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1. Introduction

Problems of financial difficulties often occur in both large and small companies. Financial difficulties as a condition where the company's finances are in an unhealthy state, or a crisis that occurred before bankruptcy. In Indonesia there are a number of examples of cases that show the condition where companies in Indonesia experience financial difficulties. Some examples of companies in Indonesia experiencing financial difficulties such as PT. Asuransi Jiwasraya who is experiencing financial difficulties so that it results in late payment of the policy due (source: anonymous, www.cnbindonesia.com). Another example is the company PT. Krakatau Steel Persero Tbk (KRAS). This state-owned steel company is repeatedly troubled by problems. For 7 years in a row this company suffered losses and mass layoff issues until the resignation of independent commissioners recently. In addition, there is also PT. Garuda Indonesia Persero Tbk, which was recently highlighted by aviation public because it suffered losses of up to Rp. 2.45 trillion which shows the financial difficulties at this company (Mufti, 2019).

In its management system, companies must implement good corporate governance because it allows a company to experience a healthy condition and in good financial condition. Achievement of a financially healthy company is obtained through the results of management interaction in managing funds and the environment around the company both internal and external environment (Nuresa, 2013). Companies that experience financial difficulties relatively have weaknesses in corporate governance (Lu and Chang, 2009). The better corporate governance by a company, the better the performance of a company is expected. Based on these assumptions, it can be concluded that the failure of the company in overcoming financial difficulties due to poor corporate governance, for example, inappropriate decisions made by management or lack of efforts to oversee financial conditions so that there is improper use of funds (Nuresa, 2013).

Corporate governance has become very important in Indonesia after the financial crisis in Asian countries, including Indonesia, in 1997. The establishment of an audit committee is one of the important things in creating good corporate governance. The audit committee is expected to be effective and focus on optimizing shareholder wealth and prevent maximization of personal interests by top management (Nuresa, 2013). The audit committee is a strategy of the company's success and efforts to achieve the success of a company. Emrinaldi (2007) states that the more the number of independent commissioners in a company, the smaller the potential for financial difficulties because supervision of the implementation of company management gets more supervision from an independent party.

Every company tends to need support or injection of funds from investors. The funding support is one of the solutions in anticipating the problem of financial difficulties in order to achieve the image (picture) of a company with a good reputation. One way to maintain the good name of the company so that investors and shareholders trust is by disclosing quality corporate social responsibility. Disclosure of Corporate Social Responsibility (CSR) provides company information to the public relating to the environment, employees, customers, communities and energy used by the company (Said, Zainuddin and Haron, 2009). Disclosure of CSR is also based on Republic of Indonesia Law No. 40 of 2007 article 74 concerning social and environmental responsibility states that social and environmental responsibility, namely "the Company which carries out its business activities in the field and or related to natural resources must carry out social and environmental responsibility". This law is further strengthened by Government Regulation of the Republic of Indonesia No 47 of 2012 concerning Social and Environmental Responsibility of Limited Liability Companies article 2 states that every Company as a legal subject has social and environmental responsibility.

Disclosure and implementation of CSR activities provide several benefits such as products favored by consumers and investors, sales and market share increases, brand positioning becomes known, employees become loyal and operational costs fall (Kolter and Lee, 2005). This has led companies in Indonesia to generally disclose CSR

voluntarily in the company's annual report. Few companies in Indonesia have even disclosed CSR reports separately, known as standalone reports. Several other companies disclose CSR by using external verification services (assurance) and reporting guidelines. Basically CSR information disclosure through standalone report, assurance and reporting guidelines aims to improve the quality of disclosure. Standalone report focuses on social and environmental information aimed at stakeholders (Dhaliwal et al., 2012; Anugerah, Saraswati, Andayani, 2018). Assurance services can increase the credibility of CSR reporting (Cohen & Simnett, 2015; Habek & Wolniak, 2015; Anugerah, Saraswati, Andayani, 2018). The third reporting practice is to guide the preparation of the report, namely the Global Reporting Initiative (GRI). The use of the GRI reporting framework is used as a guide to standardizing sustainable reports internationally (Gray, 2001). The GRI Guidelines are used as a guide in the preparation of ongoing reports, to enhance the credibility of information disclosed by companies.

The quality of CSR disclosure is important to pay attention to in order to control social and environmental risks (Gray, 2001; Quattrocioni et al., 2019; Wu & Hu, 2019) and produce relevant information for stakeholders. However, in research conducted by Anugerah, Saraswati, Andayani (2018) using a quality measurement framework made by Michelin, Pilonato, & Ricceri (2015) as a tool to measure the quality of CSR disclosure in the Indonesian state, different assumptions were found that state voluntary practices from the stand alone report, assurance and reporting guidelines do not improve the quality of disclosure. Friedman (1970) also states that disclosures have high quality when able to provide useful information to external users.

These different assumptions form the basis of research in research. So as to be able to explore the truth of corporate governance goals and achieve quality CSR reporting. This research can also provide solutions to conditions before and when the company is experiencing financial difficulties and provide things that are considered important to anticipate the possibility of financial difficulties.

2. Literature review

2.1. Agency Theory and Stewardship Theory

Agency theory has its basis in economic theory which was coined by Alchian and Demsetz (1972) and developed by Jensen and Meckling (1976). Agency theory is defined as the relationship between principals such as shareholders and agents such as managers and corporate executives. Clark (2004) states that the owner delegates his company to Principal directors and managers or the company owner pays the agent to carry out his work. Daily et al (2003) state that there are two factors that can arise in agency theory. First, this theory can reduce the corporation of two participants, namely managers and shareholders. Second, agency theory states that employees or managers focus more on their own interests. The basic premise of agency theory between the owner and agent, as stated by Jensen and Meckling (1976), is that there is a contractual relationship between the owner and agent. In agency theory, shareholders expect that agents act and make decisions in accordance with the interests of the owner. Instead, the agent does not make the best decision in accordance with the interests of the owner. Agency problems arise from the separation of owner and control in agency theory as stated by Davis, Schoorman and Donaldson (1997). In agency theory, agents can act in their own interests, and behave opportunistically. Providing incentives to the agent will result in the agent focusing on the interests of the owner. Agency theory further explores the relationship between owner and management structure. The separation between owner and agent allows the agency model to be applied to harmonize between management and owner's goals. In family businesses, management consists of family members, so agency costs can be minimized (Eisenhardt, 1989).

In contrast to agency theory, stewardship theory focuses on non-economic influences (Mason et al, 2007). Agency theory provides the view that governance is based on economic interpretations of relationships in organizations, stewardship theory is more a series of non-financial motivations of management activities. These management activities include the need for achievement and recognition, intrinsic satisfaction achieved from successful performance and full ethical work. The basic premise of stewardship theory is stated by Donaldson and Davis

(1991) that managers are stewards of the corporation and work to obtain high profits and returns for shareholders. The financial performance of the organization and shareholder wealth will be maximized by empowering managers to work with authority that does not burden and remains responsible.

Stewardship theory emphasizes more on managers acting as stewards who are a team and are not motivated by individual goals, but are motivated by goals that are aligned with the owner's goals (Davis et al, 1997). Stewardship theory positions managers as rational and opportunistic individuals who will maximize their own utility. The basis of the Stewardship model is a culture of trust between owners and managers (Mason et al, 2007).

2.2. Audit Committee and Independent Commissioner

Financial Services Authority Regulation No. 55/POJK.04/2015 concerning the Establishment and Guidelines for the Work of the Audit Committee states that the Audit Committee is a committee formed by and responsible to the Board of Commissioners in helping to carry out the duties and functions of the Board of Commissioners. The Audit Committee consists of at least 3 (three) members who are from Independent Commissioners and Parties from outside the Issuer or Public Company. The audit committee is chaired by an Independent Commissioner. The Audit Committee acts independently in carrying out its duties and responsibilities.

Article 10 explains that the Audit Committee has the duty and responsibility to review financial information, review compliance with laws and regulations, provide independent opinions in the event of disagreements between management, provide recommendations to the Board of Commissioners, examine internal auditors' audits, review risk management activities, examines complaints about the accounting process and financial statements and provides advice to the Board of Commissioners if there is a potential conflict of interest of the issuer and maintains the confidentiality of the issuer's documents, data and information.

2.3. Corporate Social Responsibility

The concept of CSR emerged around the 1950s, after which it developed in the USA and Europe. CSR is a company's commitment to contribute to sustainable economic development, working with employees, their families, local communities and the larger community to improve their quality of life (World Businesses Council for Sustainable or WBCSD, 2004). Servaes and Tamayo (2013) state that this definition consists of components in CSR research, namely: community, human rights, the environment and treatment of employees.

Several studies have shown the contribution of CSR activities that can be used to reduce risk. Attig et al. (2013) describe three channels for CSR and risk relationships. First, by increasing a company's relationship with stakeholders, this can improve the long-term sustainability of the company. Secondly, by engaging in CSR activities, a company shows efficient use. Third, with positive CSR involvement, companies can reduce the likelihood of costs associated with socially irresponsible behavior. In line with their postulations, Attig et al. (2013) shows a positive relationship between CSR activities of companies and credit ratings. This is reinforced by the findings of Kim et al. (2014) who discovered the contribution of CSR in reducing the risk of stock price collisions.

2.4. The relationship between the audit committee and financial difficulties

The audit committee must have enough members to carry out its responsibilities so that the audit committee is effective in carrying out its duties in monitoring and controlling the activities of the board of directors (Rahmat et al., 2009). Based on BAPEPAM-LK regulation No. IX of 2004 concerning "the establishment and Implementation Guidelines for the work of the audit committee", the audit committee has at least three members who are considered capable of protecting the interests of shareholders. Based on the theory of resource dependency, it can be assumed that the increasing number of members will make the audit committee have more resources, especially to deal with problems that are being experienced by the company. Therefore, the

effectiveness of the audit committee will increase when the size of the committee also increases so as to prevent the company from financial difficulties. Based on the description above, the following hypothesis is formulated:

H1: The size of the audit committee has a negative effect on financial difficulties

2.5 Relationship between independent commissioners on financial difficulties

The Independent Commissioner has a function to oversee the performance of directors in running the company as well as the implementation of good corporate governance in addition to the board of commissioners in the company. The independent board of commissioners monitors the performance of the board of directors led by the director and acts independently without any influence from parties in the company. Research conducted by Hong-xia Lie, et al. (2008) succeeded in proving that the proportion of independent directors was negatively related to financial distress. These results support research conducted by Nur (2007) which states that there is a significant negative effect of the proportion of independent directors on financial distress. The higher the proportion of independent directors, the smaller the possibility of financial distress. Based on the description above, the hypothesis is formulated as follows:

H2: Independent Commissioner has a negative effect on financial difficulties

2.6 The relationship between CSR and financial difficulties

Godfrey (2005) theorizes that CSR can provide protection such as insurance when a company enters a crisis. For example, companies with proactive CSR involvement in managerial practices such as environmental assessment and stakeholder management (Wood, 1991) tend to be able to anticipate and reduce potential sources of business risk, such as potential government regulations, labor unrest, or environmental damage (Orlitzky & Benjamin, 2001).

Smith and Stulz (1985), who explain that companies that maximize value rationally acquire risk management instruments when companies expect financial difficulties in the future. This is because the most valuable risk management instruments for companies when the expected financial distress costs become so burdensome that bankruptcy becomes close. CSR involvement can be used as an instrument of risk management in the hope that previous CSR involvement can reduce the cost of distress and will reduce the possibility of bankruptcy. Based on the description, the suggested hypothesis is:

H3: CSR has a negative effect on financial difficulties

3. Research Methods

3.1 Population

The population in this study are all companies listed on the Indonesia Stock Exchange (IDX). Companies engaged in the field of natural resources (SDA) were not included in this study on the grounds there were differences in obligations in reporting CSR. Companies engaged in the field of natural resources are required to report their social responsibility in accordance with Law number 40 of 2007 article 74, while companies other than these fields are still voluntary. This research focuses on voluntary CSR reporting, so companies engaged in natural resources are not included in the population.

3.2 Research Samples

Samples were taken from the companies financial statements. The sampling method used in this study is nonprobability sampling with a purposive sampling technique. Purposive sampling is a sampling technique based on a certain or specific criteria (Sekaran & Bougie, 2013: 252). The criteria used to take this research sample are:

1. Companies listed successively on the Stock Exchange from 2014 to 2016.
2. The company issues a stand-alone report or an annual report that can be accessed from both the IDX and the company's website.
3. The company has CSR or sustainability information in the annual report.

Year from 2014 to 2016 was chosen as the sample of this study because in that year it was a period of using GRI G4 in Indonesia. This was chosen by the researcher to get specific results. The sample in this study are (see Table 1).

Table 1. Sample Selection

No.	Sample Selection	Total
1.	Public companies listed on the Indonesia Stock Exchange from 2014 to 2016	1538
2.	Companies engaged in the field of natural resources listed on the Stock Exchange from 2014 to 2016	(185)
3.	Sample Selection	1353

From the population that has been determined, researchers then determine a sample that represents the population using the Slovin formula (Sevilla et al, 2007). Application of Slovin formula can be seen in the following formula.

$$n = N / 1 + Ne^2$$

Information:

n = Sample size

N = Population Size

e = significance level (5%)

Researchers used the Slovin formula to get the number of samples to be used in this study. The details are as follows:

$$n = N / 1 + Ne^2$$

$$n = 1353 / 1 + 1353(0.05)^2 = 308.72 = 309$$

Information:

n = Sample size

N = Population Size

e = significance level (5%)

3.3. Operational Definition and Measurement

3.3.1. Independent Variable

Corporate governance

Corporate Governance in this study was measured using the size of the audit committee and the size of the independent commissioner. The size of the audit committee is the number of people serving on the audit committee, while the size of the independent commissioners is the percentage of the Independent Commissioners divided by the number of the board of commissioners.

CSR

The independent variable in this study is CSR which is measured by the quality of CSR disclosure. Researchers used the Michelon, Pilonato, & Ricceri (2015) model to evaluate the quality of CSR disclosures. Measurement of disclosure quality consists of quantity (relative quantity), information density (density), accuracy of information (accuracy), and management approach (managerial orientation). Relative quantity measures how many items are expressed by a company compared to the average of items expressed by other companies in the same industry. Relative quantity can be seen in the following formula:

$$RQT_{it} = DISC_{it} - \widehat{DISC}_{it}$$

Information:

RQT_{it} = Relative quantity index for company i in year t.

$Disc_{it}$ = The number of items disclosed by company i in year t.

\overline{DISC}_{it} = Estimated level of company disclosure i in year t

Density measures how many sentences are relevant to the GRI G4 core options compared to the total sentences expressed. Density can be seen in the following formula:

$$DEN_{it} = \frac{1}{K_{it}} \sum_{j=1}^{K_{it}} CSR_{ijt}$$

Information:

DEN_{it} = Desity index for company i in year t.

K_{it} = The number of items disclosed by company i in year t.

CSR_{it} = The value is 1 if sentence j contains CSR information on company i in year t, conversely the value is 0.

Accuracy measures the way a company discloses information, such as disclosing information in qualitative, quantitative or monetary sentence form (in currency). Accuracy can be seen in the following formula:

$$ACC_{it} = \frac{1}{n_{it}} \sum_{j=1}^{n_{it}} (w * CSR_{ijt})$$

Information:

ACC_{it} = Accuracy index for company i in year t.

n_{it} = Number of sentences containing CSR information in the company report i in year t.

CSR_{ijt} = The value is 1 if sentence j contains CSR information on company i in year t, conversely the value is 0.

W = The value is 1 if the sentence j in company report i in year t is in the form of qualitative, the value is 2 if the sentence j in report company i in year t is monetary.

Managerial Orientation measures the approach the company adopts in disclosing CSR information, whether using the boilerplate or committed approach. The boilerplate approach is a company approach that tends to express expectations and hypotheses in providing expectations in the future, and provides rules, initiatives and strategies in expressing the results. While the committed approach is a company approach that tends to reveal the targets and goals in the future, by disclosing the results and outputs of the realization that has been done. Managerial orientation can be seen in the following formula:

$$MAN_{it} = \frac{1}{n_{it}} \sum_{j=1}^{n_{it}} (OBJ_{ijt} * RES_{ijt})$$

Information:

MAN_{it} = Managerial orientation index for company i in year t.

n_{it} = Number of sentences containing CSR information in the company report i in year t.

OBJ_{it} = The value of 1 sentence j on company report i in year t contains CSR information in the form of targets and objectives, otherwise the value is 0.

RES_{it} = The value is 1 if sentence j on company report i in year t contains CSR information in the form of results and outputs, otherwise the value of 0.

The four indices are then synthesized using the following formula:

$$Quality_{it} = \frac{1}{4(RQT_{sit} + DEN_{sit} + ACC_{sit} + MAN_{sit})}$$

Information:

Quality_{it} = The quality of disclosure obtained from the combination of the four indices whose values have been standardized.

RQT_{sit} = Standardize relative quantity index for company i in year t.

Dens_{sit} = Standardize density index for company i in year t.

ACC_{sit} = Standardize accuracy index for company i in year t.

MAN_{sit} = Standardize managerial orientation index for company i in year t.

In summary the disclosure variables can be seen in the table 1 below (Appendix 1). Disclosure variables consist of Relative Quantity, Density, Accuracy, Managerial Orientation and Quality variables. CSR items using GRI and Michelin, Pilonato, Richeri (2015) can be seen in Appendix 2. These items include environmental items, social items, human rights items, community items and product responsibility items.

3.3.2. Dependent Variable

The dependent variable in this study is financial difficulty. financial difficulties are measured by the value of earnings before tax (EBT). The greater the value of EBT, the less likely the company is experiencing financial difficulties. Earning before tax (EBT) is used because if this ratio is high shows that the company can utilize its assets rationally so that profits can be generated and reduce the possibility of financial difficulties (Rahmawati and Hadiprajitno, 2015).

3.4 Data Analysis Methods

The method used in this study is multiple regression processed with the help of SPSS analysis tools. Before this model was regressed it had passed the classic assumption test. The model used to measure the three variables in this study are as follows:

$$FD = \alpha + \beta_1 KA + \beta_2 KI + \beta_3 CSR + e$$

Information:

FD = Financial Difficulties/Financial Distress

KA = The number of Audit Committee.

KI = The number of Independent Commissioner.

CSR = Quality of Corporate Social Responsibility Disclosure.

4. Results of research and discussion

4.1. Descriptive statistics

This study examines the relationship of corporate governance (CG) and corporate social responsibility (CSR) in minimizing or preventing financial difficulties. The independent variables in this study consisted of two, namely CG, which was proxied by an audit committee (KA) and an independent commission (KI). Second is the CSR variable which is proxied by the quality of CSR disclosure. The dependent variable in this study is financial difficulty (FD). The results of descriptive statistical testing for this study are (see Table 2):

Table 2. Descriptive Statistics

Variabel	N	Minimum	Maximum	Mean	Std. Deviation
FD	309	-8634034000000	64506779000000	2639542084485,43	7059705943047,021
KA	309	1	4	2,24	0,807
KI	309	1	6	2,27	0,909
CSR	309	0,12	0,97	0,2636	0,13579

Descriptive statistical test results show that as many as 309 companies that were sampled listed on the Indonesia Stock Exchange reached a figure of financial difficulty (FD was measured by earnings before tax) of 2639542084485.43 from 2014 to 2016. The lowest minimum value of FD achieved by sample companies from 2014 to 2016 that is equal to -8634034000000 while the highest FD (earnings before tax) value achieved is 64506779000000. The achievement of FD values in 390 sample companies from 2014 to 2016 is caused by the average CG and CSR indicators that drive the achievement of FD values, where the average value of the audit committee that is, 2.24 with a minimum range of audit committees that is 1 and the maximum number of audit committees is 4. The average range of independent commissions for all samples is 2.27 with the minimum number of independent committees that is 1 and the maximum maximum number is 6. Results the test also showed the average achievement quality of CSR disclosure was 0.23 636 with a minimum quality range of 0.12 and a maximum quality of 0.97. Each average value on the independent variable is greater than the average value so it can be assumed that the data for the independent variable varies. Whereas the dependent variable does not vary.

The results of this test indicate that each company does not meet the standard number of audit committees and independent commissions set in POJK No.55/POJK.04/2015 which requires a minimum number of audit committee (KA) and independent commissioner (KI) to be around 3 people. This condition pushed the level of financial difficulties in all sample companies to become high. This is supported by the quality of CSR disclosure that does not even meet the average of 0.50%. CSR disclosure is bad in every sample company because the number of KA and KI that do not meet the standard criteria is not able to provide a preventive effect in order to minimize financial difficulties from 2014 to 2016 for all companies sampled.

4.2. Regression Test Results

In this study a logistic regression model was used to test the hypotheses of the relationship of corporate governance (CG) and corporate social responsibility (CSR) to the variable of financial difficulties. The logistic regression model will provide a significance value which is the contribution value of each CG (KA and KI) and CSR variables to financial difficulties (FD) to determine the hypothesis decision. The level of significance for hypothesis decisions is below 5% (<0.05). The regression test results are as follows (Table 3):

Table 3. Regression Test Results

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	1501967565066,944	1643504657669,089		0,914	0,362		
KA	252173998569,655	656777706380,595	0,029	0,384	0,701	0,532	1,880
KI	-1298548917685,295	587090259606,889	0,167	2,212	0,028	0,525	1,906
CSR	-9004541324196,800	2990162956676,884	-0,173	-3,011	0,003	0,907	1,102

The test results show the proxy measurement committee audit (KA) showed an insignificant significance value that is equal to 0.701 (above 5%) so that hypothesis 1 in this study was rejected. This shows that the audit committee has no significant effect on financial difficulties. This is in line with the assumptions developed by Hanifah and Purwanto (2013) and Mayangsari (2015) which assume that the audit committee in a company has

insignificant influence on financial difficulties. More and more audit committees sometimes make it difficult to agree on decisions to improve financial performance. This is because the selection of the audit committee is still based on opportunistic encouragement and intense closeness with the board of commissioners (Effendi in Siagian, 2004).

Inversely proportional to the proxy of an independent commissioner (KI). The test results show the significance value of KI is in the range of 0.028 (below 0.05) which shows the significance of KI against FD with a coefficient value of -1298548917685,295. This means that IC has a negative effect on financial difficulties and it can be concluded that the more the number of independent commissioners, the lower the percentage of the possibility of financial difficulties, therefore it can be concluded that hypothesis 2 suggested in this study was accepted. This supports the assumptions developed by Elloumi and Gueye (2001) which assume that the greater proportion of independent directors in a company has a significant negative influence and reduces financial difficulties. However, the different test results between the audit committee (KA) and the independent commissioner (KI) which are the two main proxies in CG show that the governance system of companies in Indonesia has not become a solutive governance system in minimizing corporate financial difficulties.

The test results also show that the level of significance of CSR on financial difficulties (FD) is around 0.003 (below 0.05) which shows the quality of CSR disclosure will be able to encourage a decrease in the value of financial difficulties in the future. These results provide support for hypothesis 3, namely the application of CSR can be an insurance to form trust in the efficiency of company resources which has implications for stakeholder confidence so that the company's operational funds will increase through investment and will be a good solution in reducing future financial difficulties in the company in Indonesia. These results provide support for the assumptions developed by Godfrey (2005) and Smith and Stulz (1985) who assume the same thing.

Table 4. Adjusted R Square Value

Model	R	RSquare	Adjusted R Square	Std. Error of the Estimate
1	,291a	,085	,076	6786887573225 ,492

Table 4 shows the adjusted R² value of the relationship between corporate governance (KI and KA) and corporate social responsibility (CSR) variables to financial distress (FD). The adjusted R² value will show the value of the contribution in the relationship of the independent variable to the dependent variable (Ghozali, 2009). This value will explain what percentage of ability of the independent variable in explaining the dependent variable. The test results show that the adjusted R² value is around 0.076 (7.6%). So it can be concluded that the contribution of CG through the proxy committee audit (KA) and independent commissioners (KI) and CSR to the magnitude of the value of financial distress (FD) is only around 7.6% while the rest is explained by other variables.

5. Discussion and Conclusions

This study examines the relationship between corporate governance (CG) and corporate social responsibility (CSR) on financial difficulties. The sample used in this study were all companies listed on the Indonesia Stock Exchange (IDX) with the exception of companies engaged in natural resource development (SDA). The observation period in this study is from 2014 to 2016. The CG variable measurement indicators use two proxies namely the audit committee (KA) and the independent commissioner (KI) while CSR uses the CSR disclosure quality index using the Michelon et al model. (2015).

The test results show that CG has no significant effect on financial difficulties. This is due to the absence of synergy or conformity in the level of significance between the two proxies used where KA is not significant (H1 is rejected) while KI is significant (H2 is accepted). The contribution of the proportion of independent directors apparently contributed more to the proportion of ownership of the audit committee. The proportion of the audit

committee in fact was not able to minimize or even be the solutive effect of the company's financial difficulties in Indonesia. The composition of the number of audit committees regardless of the amount can be said to be a regulation which in fact does not bring profit because it does not become a point to optimize wealth. The most likely reason is that the audit committee is a form of responsibility for compliance with government regulations in BAPEPAM LK No. IX of 2004 and BAPEPAM Decree No. 29 of 2004. Besides Effendi dalama Siagian (2004) explains that the existence of audit committees in public companies is only shown to meet regulations, this is because the formation of an audit committee is still determined through personal closeness built with the board of commissioners. Inversely proportional, the composition of independent commissioners has significantly contributed to the reduction in financial difficulties. This supports the assumptions developed by Emrinaldi (2007) and Hong-xia Lie et al., (2008) who together assume that the proportion of independent directors can negatively affect the value of future financial difficulties of public companies through the principle of independence that is implemented. However, overall regulations in the GCG system of companies in Indonesia have not been able to prevent the percentage of financial difficulties in the future.

The test results also support hypothesis 3 with the assumption that the quality of CSR disclosure has a significant negative effect on the company's financial difficulties. Disclosure and implementation of CSR activities can have an effect to minimize financial difficulties through the option to reduce the risk of misuse of company operational funds that can provide guarantees for increasing operational funds for sustainable financial performance for the company so that if the company experiences financial difficulties in the future, the guarantee of funds will remain distributed both so as to minimize the financial difficulties experienced by the company. These results provide support for the assumptions developed by Attig et al., (2013), who assume that CSR practices improve a sustainable company relationship with stakeholders by using more efficient operational resources and reducing costs associated with behavior, which is socially not responsible. The effect of this implementation is the existence of operational value that is increasing and continuing. In addition, the results of this study also support the assumptions developed by Kim et al., (2014) who assume that CSR can be a preventive option in minimizing the risk of financial difficulties due to collisions or falling stock prices.

Overall, it can be concluded that the internal regulations of companies in the corporate governance system in this case the formation of the proportion of the audit committee and independent commissioners still need to be updated to be able to work together to prevent and minimize the possibility of financial difficulties in the future and also the implementation or implementation of CSR either in terms of disclosure and implementation of social activities or CSR needs to be strengthened so that it can be used as a solution in preventing and minimizing financial difficulties in the future.

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Appendixes:

Appendix 1

Disclosure Variable	Definition
<i>Relative quantity</i>	RQT_{it} is relative quantity for company i in year t, $Disc_{it}$ is the number of items disclosed by company i in year t, and $Disc_{it}$ is the estimated level of company i disclosure in year t.
<i>Density</i>	Den is density index for company i in year t_1 , k_n is the total sentences on company i's report in year t_1 and $CSR_a=1$ if sentence j contains CSR information on company i in year t vice versa then $CSR_a=0$
<i>Accuracy</i>	Acc_i is accuracy index for company i in year t_1 , n_1 is the number of sentences containing CSR information in company i report in year t_1 and $CSR_a=0$ otherwise and $w=1$ if sentence j on company report I jika kalimat j pada laporan perusahaan i di tahun t berbentuk kualitatif, $w=2$ jika kalimat j pada laporan perusahaan i di tahun t berbentuk kuantitatif, dan $w=3$ jika kalimat j pada laporan perusahaan i di tahun t berbentuk monetary.
<i>Managerial Orientation</i>	MAN_{it} adalah managerial orientation index untuk perusahaan i di tahun t, n_a adalah jumlah kalimat yang mengandung informasi CSR pada laporan perusahaan i in year t, $OBJ_a=1$ if the sentence on company report i contains CSR information in the form of mission and objectives, and $OBJ_{it}=0$ if in the form of results and output, and $RES_{it}=0$ otherwise
<i>Quality</i>	Combine of the four indices above.

Appendix 2

Content	Sustainability Information
Environmental Items	Materials
	Energy
	Water
	Biodiversity
	Emissions
	Effluents and Waste
	Products and Services
	Compliance
	Transport
	Overall
	Supplier Environmental Assessment
	Environmental Grievance Mechanisms
Social Items	Employment
	Labor/Management Relations
	Occupational Health and Safety

	Training and Education
	Diversity and Equal Opportunity
	Equal Remuneration for Women and Men
	Supplier Assessment for Labor Practices
	Labor Practices Grievance Mechanisms
Human Rights	Investment
	Non-discrimination
	Freedom of Association and Collective Bargaining
	Child Labor
	Forced or Compulsory Labor
	Security Practices
	Indigenous Rights
	Assessment
	Supplier Human Rights Assessment
	Human Rights Grievance Mechanisms
Society	Local Communities
	Anti-Corruption
	Public Policy
	Anti-competitive Behavior
	Compliance
	Supplier Assessment for Impacts on Society
	Grievance Mechanisms for Impacts on Society
Product Responsibility	Customer Health and Safety
	Product and Service Labeling
	Marketing Communications
	Customer Privacy
	Compliance

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Wuryan ANDAYANI, PhD. is a senior lecturer in Accounting Department, Faculty of Economics and Business, Brawijaya University, Malang, Indonesia. Her research interest is Corporate Governance, Corporate Social Responsibility, Public Sector Accounting, Sustainability Accounting, Accounting

ORCID ID: <https://orcid.org/0000-0001-5023-1294>

Dalila DAUD, PhD. is a researcher in Accounting Research Institute (ARI) and senior accounting lecturer in Faculty of Accountancy, University Teknologi MARA. She has been 16 years in academic line and her research interest is on Endowment and entrepreneurship, Accounting and Governance, Philanthropy Studies, SDG.

ORCID ID: <https://orcid.org/0000-0001-8903-9750>



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THE MODEL OF AN ORGANIZATION PERFORMANCE MEASUREMENT IN THE CONTEXT OF SUSTAINABLE SYSTEM MANAGEMENT*

Aneta Wysokińska-Senkus

War Studies University, Al. gen. Antoniego Chruściela "Montera" 103, 00-910 Warsaw

E-mail: aneta.senkus@gmail.com

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Abstract. The modern world poses many challenges to organizations, which are associated with changes in economic reality. The continuous changes in their environment create many new possibilities, which, if properly used, can contribute to a success of an organization but a delayed response to the same changes may cause a huge risk. The organizations are seeking the frameworks to comply with requirements in the different areas including legal, social, economic or ecological environment that would allow to manage and measure the performance of the organization as system. The following paper provides the solution for the organization – the sustainable system management framework based on research either management experts or organizations leaders that covers all phases from stakeholder identification and analysis through the sub-targets setting and the relations amongst in the key perspectives of organization's operation: legal, economic, social and ecological; to the methods of measuring organization performance.

Keywords: sustainability; management systems; performance; performance measurement

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JEL Classifications: M10, M14, M20

Additional disciplines: ecology and environment

1. Introduction

The modern world poses many challenges to organizations, which are associated with changes in economic reality. The continuous changes in their environment create many new possibilities, which, if properly used, can contribute to a success of an organization but a delayed response to the same changes may cause a huge risk.

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Organizations in the decision-making process should diagnose many aspects of their business operations and their business strategies: economic, social, environmental and ethical ones (related to the human and consumer rights) and then they should determine key objectives in these areas.

According to P. F. Drucker, the management process requires a comprehensive system of indicators, which allows monitoring, evaluating and improving operational efficiency continuously and comprehensively. The set of such financial, economic, social and market indicators has to be adapted to a given organization.

The enrichment of a strategy of an organization with a set of indicators, which allow assessing its effectiveness, is a prerequisite for a success in the dynamically changing environment (Senkus, 2014).

2. Sustainable System Management

The term “Sustainable system management proposed by the author (Wysokinska-Senkus, 2013) could be based on the concept of system thinking. The system thinking concept has been created by Peter Senge and since then, is the foundation of building a learning organization. Senge have distinguished five disciplines of learning organizations, that include:

- Building a Shared vision – creating a clear and specific goal of the organization, a true and actual vision that is known to all members of the organization and which promotes learning processes;
- Systems Thinking – perception of all individual phenomena in the category of whole processes or structures, perception of interdependencies and feedback (when the phenomenon affects its own future);
- Mental Models – ability to critically approach rooted beliefs, values, stereotypes or patterns of thinking and acting and to make them aware, analyze, change or reject them;
- Team Learning – the teams, not the individuals, are the basic learning cells. The team is a greater carrier of intellectual potential than its individual members put together;
- Personal Mastery – a process of continuous improvement in both formal professional skills and in moral and mental abilities, thanks to which one can set goals and a vision of one's life.

According to Senge, system thinking is a key discipline of a learning organization that underlies the other learning disciplines of an organization that integrates and strengthens all the above-mentioned disciplines. He emphasizes the fact that *"the whole can exceed the simple sum of the parts". All are concerned with a shift of mind from seeing parts to seeing wholes, from seeing people as helpless reactors to seeing them as active participants in shaping their reality, from reacting to the present to creating the future. „As the fifth discipline, systems thinking is the cornerstone of how learning organizations think about their world.” (Senge 1990).*

The essence of the discipline of systemic thinking is to change the way of thinking consisting in seeing multidirectional mutual relations instead of linear cause-and-effect chains, seeing change processes.

D. Hoyle, author of the book "ISO 9000 Quality Systems Handbook - Using the standards as a framework for business improvement" assumes that the management system in an organization may consist of many partial subsystems improving the organization's operation in specific areas. Standardized management systems can be considered narrower than systemic management, but by implementing a specific management system in line with the requirements of ISO 9001, ISO 14001, OHSAS and others, the goals set by Senge can be achieved.

Nowadays an organization is required to consider a wide spectrum of aspects such as quality, environment, occupational health and safety on the way to the implementation of standardized systems. This multi-faceted approach brings the organization closer to achieving success in order to achieve sustainability.

So where do you look for organizations that are system managed? Based on Hoyle's observations, it can be assumed that organizations that have been certified in management systems are systematically managed. These

are organizations that constantly implement new management systems that allow for more effective management of many aspects of functioning, e.g. environmental, occupational health and safety management, food safety, relations with organization's stakeholders, etc. in order to find a path to sustainability, identified with balanced success. So, if you want to diagnose system-managed organizations, you can look for them among those that have implemented and certified management systems.

Since Senge's system management definition is too general and applicable in many areas, such as physics, sociology, engineering and management, the author decided to specify it and refer the term directly to the organization's management.

System management is management based on the use of the principles of system thinking, consisting in perceiving mutual relations between individual aspects of the organization's functioning and the external environment (and therefore all the stakeholders of the organization), taking into account changes over time, as well as analyzing the causes and effects of these changes and focusing on these which are of key importance for organizations in the legal, economic, social and environmental dimensions with a focus on sustainability and innovation.

The author includes the following aspects of the organization's functioning: processes, resources (human, financial, material and information), elements of organizational culture, organizational strategy, organizational goals, relations with stakeholders and the natural environment. The prerequisite for implementing system management is the identification of all processes in the organization.

Based on the conducted literature studies and the field studies (Wysokinska-Senkus, 2013; Senkus, 2017) the author adopted the assumption that organizations that have implemented quality, environmental and occupational health and safety management systems take into account a wide spectrum of aspects focused on quality, the environment, occupational health and safety, and this multi-faceted approach brings the organization closer to achieving success on the road to implementation of sustainability.

The following sustainable system management principles could be defined:

- measuring the effectiveness of the organization on many levels,
- identification of key processes in the organization,
- cause and effect analysis of interrelationships between processes in the organization,
- identification of strategic control points (SPK - action, place which is particularly important from the point of view of improving the efficiency of the organization),
- identification of causes and effects of irregularities in SPK,
- designing monitoring methods and accountability regarding strategic checkpoints,
- designing corrective and preventive actions at strategic checkpoints,
- analyzing the links between the organization's strategy and the SPK,
- organization resource efficiency analysis,
- identification of key Stakeholders of the organization and assessment of the degree of organization's impact on individual Stakeholders,
- developing a model of mutually beneficial relations with stakeholders,
- supporting teamwork and project orientation,
- increase of the organization's innovativeness.

Effectiveness in the implementation of system management is possible if the organization constantly undertakes actions aimed at continuous improvement of its individual elements, processes, resources, methods and management techniques, and develops mutually beneficial relations with the broadly understood environment of the organization. The condition for designing a comprehensive system for measuring the effectiveness of an organization is to make an insight in accordance with the concept of system management.

System management by analyzing the functioning of organizational elements and the interrelationships that occur between them, minimizes the risk of errors and inconsistencies, and is a preventive method that eliminates the causes of problems before they occur.

The basic aspects of the social system include:

- trust,
- common meaning, diversity,
- ability to learn
- and the ability to self-organize (Missimer, 2017).

3. The essence of organization performance measurement

The problem of organization performance is an issue, which is extremely interesting and still in the focus of research; it is also particularly important for economic practice since any increase in effectiveness is a key objective for any organization. The measurement of management effectiveness with an indication of methods is particularly important for small and medium-sized enterprises. Organizations must be aware that operating in a turbulent environment forces the process of monitoring and evaluating results of activities of organizations.

The measurement of organization performance is recognized as a key element to improve business performance (Sharma et al., 2005). An effective system for measuring management effectiveness should be balanced and dynamic; it should be a dynamic system, which helps to support decision-making processes through collecting, compiling and analyzing information (Neely et al. 2002).

The system for measurement of organization performance considering all aspects of the organization and individual perspectives allows for creating a holistic picture of the given organization (Kaplan et al., 1996) (Neely et al., 1995).

Every organization is a set of interrelated elements, which are mutually dependent on one another. If there is any change in any of the components, which create the organization, the entire organization must be changed. Rummler and Brache (2000) say that organization performance can be considered in three perspectives:

- The organizational level: it is on the organizational level that the following factors affecting the effectiveness can be distinguished: strategy, objectives on various levels of the organization, measurement methods, organizational structure and use of resources.
- The level of the process: it is on the level of the process that the following variables, which affect the efficiency of organizations, can be distinguished: interrelations among processes among individual departments, such as: development of new products, supply process, production process, sale and distribution.
- The workstation level: the variables determining organization performance at this level include: methods for recruitment and promotion, tasks and responsibilities, applicable labor standards, communication systems amongst employees and a motivation system for employees.

Rummler A. and Brache A. P. (2000) present nine variables affecting organization performance, which are shown in the diagram below and which arise from overlapping of two dimensions of the concept of effectiveness.

Table 1. Variables conditioning organization performance

EFFECTIVENESS LEVELS	NEED OF EFFECTIVENESS			
		Objectives	Way of planning	Way of managing
	Organizational level	Objectives of the organization	Designing the organization	Management of the organization
	Level of the process	Objectives of the process	Designing the process	Management of the process
	Workstation level	Objectives of the workstation level	Designing the workstation level	Management of the workstation

Source Rummler A., Brache A.P., *Podnoszenie efektywności organizacji. (Increasing organization performance)* PWE, Warsaw 2000, p. 46.

According to A. Rummler and A. P. Brache (2000), the effectiveness management includes collection of information on evaluation of products and services of a given organization carried out by customers; evaluation of real operations of the organization according to the basic evaluation criteria, which result from objectives of the organization; giving feedback on the results to the relevant subsystems of the organization; taking corrective actions; changing the objectives of the organization as a result of changes in the environment.

Organizations should be managed in a dynamic way, which consists in monitoring internal and external factors affecting functioning and in analyzing objectives and priorities of the organization (Bititci, Turner, 2000). A prerequisite to measure organization performance is to identify the factors, which affect it at all management levels in the organization.

Ittner, Larcker and Randall (2003), Gates (1999) and Otley (1999) include the strategy of the organization in the measurement of organization performance. The measurement of the effectiveness includes developing the strategy and setting targets in order to improve the effectiveness on the basis of the analysis of the results of the measurement of the degree, to which the targets have been achieved.

Two important aspects related to effectiveness of an organization should be considered, which are measurement and management of the effectiveness. According to Ittner, Larcker and Randall (2003), Gates (1999) and Otley (1999), the effectiveness management (efficiency) is a set of actions, which consist among others in setting targets and developing strategies, planning process in the organization, whose core element is decision-making, implementing plans and evaluating the implementation degree of the set targets and/or strategies. Despite the fact that some authors (Johnson and Broms, 2000) refer to a significant role of management basics in relation to effectiveness indicators, it seems to be clear that the effectiveness measurement system may shape "the information system, which is the core of the effectiveness measurement process and integrates all relevant information from all management systems in the organization" (Bititci et al., 1997).

Rose claims that "the measurement of results is the language of the progress in the organization. It shows the point, at which the given organization is and which position it takes. It functions as a guide and says, if the organization is on its way to meet its targets. It is also a powerful behavioral tool, since it reminds the employees, what is important and what should be taken into consideration in order to meet the targets of the organization" (Rose, 1995).

A holistic performance measurement system should assume a systemic approach to management assuming challenges and threats that appear in the environment (Sardi et al. 2018).

Future research should be conducted to improve the performance of nonprofits and public administration. Research to develop performance measures that reflect social approaches should be a very important mainstream

of research in organizational performance, in particular measures of social value creation and social impact as well as all intangible results that affect an organization (Månsson, 2019).

Lebas and Euske (2002) are the creators of an organization performance model in the social dimension, in which the following assumptions were made:

- Performance can be described with a set of parameters or indicators, which supplement one another and are opposing to one another in some cases. These parameters describe and evaluate the process of obtaining results of the organization;
- In particular, the consideration of the performance should be focused on current activities of the organization and on the analysis of their impact on the organization in future that implies that the performance measurement is a process characterized by a certain dynamic;
- The way of approach to the concept of the performance in the social dimension depends on the member of the organization, who defines the performance in his own way;
- The performance evaluation depends on, whether it is carried out from the external or internal perspective of the organization;
- Efficiency is always associated with responsibility;
- One can speak about efficiency, when it can be described and/or its results can be measured in order to interpret them and to take effective decisions on this basis;
- The performance indicators used in the organization should be incessantly assessed from the internal and external perspective of the organization;
- The performance measurement should not be identified with the activities, which are partially described by it;
- Effectiveness is a subjective concept, which requires evaluation and interpretation, and which affects the results and processes depending on the adopted measures and assumptions.

3. The Sustainable System Management performance improvement model

The author of the paper proposed a multi-dimensional model of system management improvement in an organization. The process of constructing the proposed sustainable system management performance improvement model S-HPD&I system improvement management model was preceded by in-depth literature studies on several hundred literature sources and consultations with thirty-five management experts, which included six management professors, ten members of leading Polish and foreign supervisory boards organizations: small, medium and large, and nineteen business consultants: including management analysts, business process analysts and auditors of leading management systems. Then the model was tested during the research done on the 180 organizations from public and private sector that have implemented at least three management systems for example quality management system, environmental management system, occupational health and safety or other.

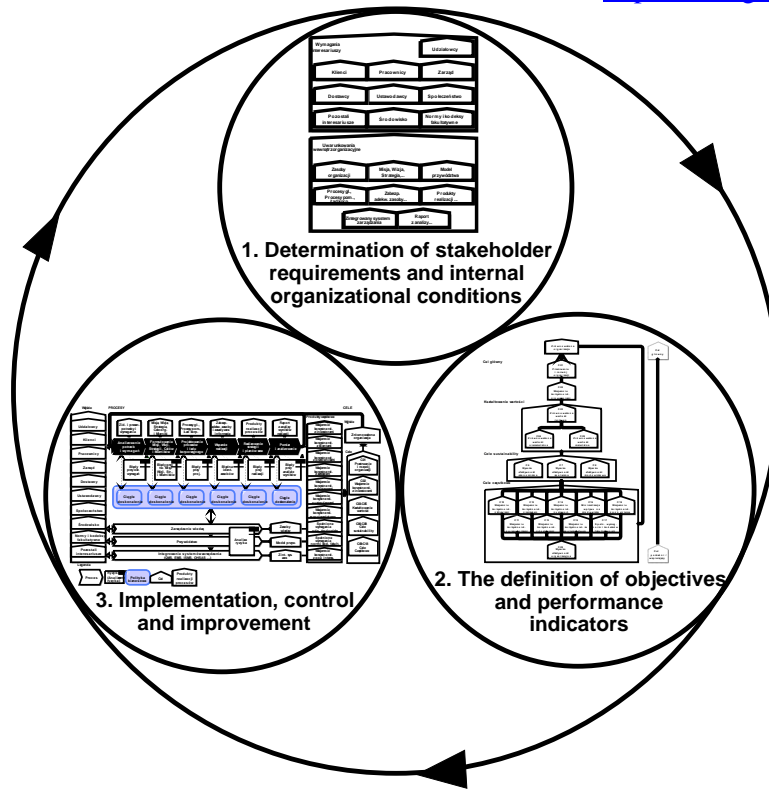


Fig.1. Strategic Holistic Performance Development and Improvement (S-HPD&I)

Source: Compiled by author

The model of the system management improvement - The Strategic Holistic Performance Development and Improvement (S-HPD&I) consist of three phases:

- Identifying stakeholders' requirements and internal conditions in the organization - Phase 1;
- Defining objectives and performance indicators - Phase 2;
- Implementation, monitoring and improvement - Phase 3.

The key element for a success of any new venture is to identify the needs of stakeholders, which are the base for determining evaluation criteria for the given project. The determination of stakeholders' requirements reveals potential risks and opportunities of the project. The tool most often used in this respect is the classic analysis of stakeholders. When the organization is aware of the specific requirements of stakeholders, of potential opportunities and risks, the set of the internal conditions in the organization, which may support or hamper the implementation of the venture, should be determined.

It is amongst stakeholders' requirements that the following ones were included in the model: of shareholders (or owners), of customers, of employees, of the board of directors, of suppliers, of legislators, of the society and other stakeholders; it was also decided to distinguish the natural environment (where the mandatory and voluntary obligations of the organization were included) as well as standards and non-obligatory codes (where the obligations of the organization resulting from the application of the standards and non-obligatory codes were included).

It was attempted to create a complete list of stakeholders, with whom organizations maintain most frequent contact and then the studied organizations were asked about the importance of the requirements of individual stakeholders. The following groups of stakeholders were distinguished: Customers, employees, suppliers,

competitors, financial institutions; business centers (local, regional, etc.); state authorities; shareholders; other business entities (internal exchange of information within a company); supervisory council; business support institutions; business associations; trade unions; groups of special interests (lobby); Media; local communities; innovation clusters; universities and research institutes.

In the group of internal conditions in a company, there are distinguished:

- Resources of an organization: the aim is to inventory the resources of the organization in order to obtain the information, if the targets set for the next phase do not exceed the capabilities of the organization.
- Mission, vision, strategy, targets of an organization and indicators - existing ones: mission, vision, strategy, targets and indicators chosen for the organization may encourage or hinder the implementation of new initiatives.
- Model of leadership: like factors mentioned above, the model of leadership may encourage or hinder the implementation of new initiatives.
- Main processes, support processes, corporate governance (Corporate governance is understood as a structured management framework, which includes mutual relations among organization elements: systems, processes and resources, which contribute to optimizing activities within the organization and promoting ethical and responsible decision-making) - it is at this stage that it is considered if the processes were distinguished and what is the ability of the organization to meet the targets through processes.
- Securing adequate resources and information management principles - the ability to secure adequate resources in relation to the ongoing tasks and information flow is analyzed here. The aim is to analyze if the organization is able to provide resources for the implementation of the projects, if it has not got them. Whereas, the way of the information management is sometimes a critical success factor.
- The products of implementation of processes - the aim is to determine if and to what extent the existing products of implementation of processes meet the requirements of stakeholders.
- Integrated management system - the aim is to determine the management system, if it is integrated, if the adopted rules support the implementation of the objectives at different levels.
- The report on the analysis of the implementation results - the aim is to determine possible difficulties, which can be faced by the organization, while accomplishing the tasks.

It should be noted that the correct identification of the internal conditions within the organization provides information, where potential problems may appear and which elements should be changed in order to be able to pursue new challenges.

The results of the studies carried out indicate that 78% of organizations recognized actions aiming at a constant analysis of the market as a key factor for the success of their activities and the importance of this factor (WRO) was rated at 0,8. The market analysis helps the organization to monitor all changes, which occur in the environment and to take actions on a regular basis aiming at adapting to changes and exploiting opportunities that arise from them.

Error! Reference source not found. it shows that both in case of organizations, which have implemented 3 management systems, as well as in case of those ones, which have implemented only a quality management system, the most important stakeholders are customers, employees and suppliers.

Table 1. The most important stakeholders in organizations with 3 certified management systems and a certified Quality Management System

Stakeholders	3 certificates		only ISO 9001	
	%	WRO	%	WRO
Customers	96.1	0.89	95.00	0.88
Employees	90.6	0.64	89.4	0.60
Suppliers	88.3	0.83	87.8	0.84
Media	84.4	0.55	60.6	0.48
Local communities	82.8	0.53	58.9	0.62
Competitors	80.0	0.76	79.4	0.70
Financial Institutions	76.1	0.77	75.6	0.69
Business Centers (local, regional, etc.)	75.0	0.83	74.4	0.72
Shareholders	71.1	0.69	83.3	0.68
State authorities	70.0	0.57	69.4	0.58
Universities, research institutes	68.3	0.60	67.8	0.49
Supervisory boards	65.0	0.63	64.4	0.6
Other business entities (internal exchange of information within a company)	64.4	0.75	63.9	0.70
Business support institutions	63.3	0.83	63.3	0.79
Trade unions	61.7	0.51	61.1	0.36
Business associations	60.0	0.70	59.4	0.68
Innovation clusters	60.0	0.68	58.9	0.65
Groups of special interests (lobby)	58.3	0.61	57.8	0.57

Source: Compiled by author.

Media had the fourth position among the organizations, which implemented 3 management systems, whereas, they were not so important for the organizations, which implemented only one management system. It is mainly due to the fact that the organizations implementing integrated systems are generally larger and more mature. These organizations were focused on shaping positive opinion amongst local communities. Universities and research institutes were positioned quite low. It is quite important since Poland is at behind the 20th position in terms of the innovation potential amongst EU countries (EC, 2016).

When the parameters of the project, opportunities and risks as well as internal parameters are already known, the targets and indicators are determined. The next stage consists in measuring the degree of realization of targets as well as in determining the criteria for the evaluation of the effectiveness in the light of the set objectives. It is through the discussion among the experts involved in carrying out studies within the project that the relations among indicated sub-targets, which should be defined in organizations, were distinguished, put in order and determined. The efficiency indicators, selected on the basis of the analysis of literature, specialized websites and specialized online forums, were assigned to the determined model targets and they were presented in the section below.

It was in the research process that the following model sub-targets were indicated:

- C₀₁ - survival and development of the organization,
- C₀₂ - mutually beneficial relations with investors,
- C₀₃ - sustainable market value,
- C₀₄ - sustainable intangible assets,
- C₀₅ - sustainable intrinsic value,
- C₀₆ - high economic efficiency,
- C₀₇ - high social efficiency,
- C₀₈ - high environmental efficiency,
- C₀₉ - high organizational performance (effectiveness)
- C₁₀ - mutually beneficial relations with customers,
- C₁₁ - mutually beneficial relations with employees,
- C₁₂ - mutually beneficial relations with the management board,
- C₁₃ - mutually beneficial relations with suppliers,
- C₁₄ - mutually beneficial relations with legislators,
- C₁₅ - mutually beneficial relations with the society,
- C₁₆ - minimization of the impact on the environment,
- C₁₇ - fulfilled requirements of optional standards and codes,
- C₁₈ - mutually beneficial relations with other stakeholders,

The achievement of the target C₀₁ - "survival and development of the organization" is affected by the degree of the accomplishment of the target C₀₂ - "mutually beneficial relations with investors". The achievement of the target C₀₂ - "mutually beneficial relations with investors" is affected by the value of the organization expressed by its market value determined by the target C₀₃ - "sustainable market value", which is a combined result of the targets C₀₄ - "sustainable intangible assets" and C₀₅ - "sustainable intrinsic value". The achievement of the targets in the total value sphere, i.e. C₀₃, C₀₄, C₀₅ is affected by the accomplished targets in the sustainability sphere, i.e. : C₀₆ - high economic efficiency, C₀₇ - high social efficiency, C₀₈ - high environmental efficiency.

The creation of the sustainable organization is affected by accomplishing the targets in the areas of: C₁₀ - mutually beneficial relationships with customers, C₁₁ - mutually beneficial relationships with employees, C₁₂ - mutually beneficial relationships with the management board, C₁₃ - mutually beneficial relationships with suppliers, C₁₄ - mutually beneficial relationships with legislators, C₁₅ - mutually beneficial relations with the society, C₁₆ - minimization of the impact on the environment, C₁₇ - fulfilled requirements of optional standards and codes, C₁₈ - mutually beneficial relationships with other stakeholders.

C₀₉ - "high organizational effectiveness" is a kind of a supporting target but it is very important in the hierarchy of the targets related to the maintenance of the effective business organization. Therefore, it determines the accomplishment of all sub-targets and contributes to obtaining of the products of the processes: R₁ - identified needs and requirements; R₂ - mission, vision, strategy, targets of the organization, indicators; R₃ - main processes, supporting processes, corporate governance; R₄ - secured adequate resources and information management principles; R₅ - products of accomplishing the processes or objectives, R₆ - data from the analysis of implementation results as well as products of the accomplishment of the supporting processes: R₇ - knowledge resources; R₈ - leadership model; R₉ - integrated management system.

On the basis of a discussion in the panel of experts, representatives of the scientific community and practitioners, the indicators were selected, which should be monitored in the effective business organizations. It is below that a set of indicators was presented, which is assigned to the targets in the S-HPD&I model and at the same time both

the assignment of the indicators to individual groups and its selection are a result of a research process and can be characterized by certain subjectivity.

The indicators to measure organization's performance were presented in alphabetical order according to their Polish names so as not to suggest their importance in the catalog of the S-HPD&I model. **Error! Reference source not found.** it shows the general groups of the indicators examined according to their objective they support.

Table 1. Characteristics of the indicators examined

		Goals	Number of indicators	The average number of indications in the group	Average WRO	Number of measured indicators	Number of indicators / Number of separate indicators
			No.	%	(0–1)	no.	%
performance measurement	C03	Sustainable market value	2	75,4	0,94	1	50,0
	C04	Sustainable intangible assets	9	29,5	0,52	5	55,6
	C05	Sustainable intrinsic value	7	32,5	0,62	6	85,7
	C09	High organizational performance (effectiveness)	4	59,6	0,87	4	100,0
The objectives of stakeholders	C02	Mutually beneficial relations with investors	95	33,9	0,58	67	70,5
	C10	Mutually beneficial relations with customers	90	40,1	0,68	70	77,8
	C11	Mutually beneficial relations with employees	90	25,2	0,43	47	52,2
	C13	Mutually beneficial relations with suppliers	66	20,9	0,40	32	48,5
	C14	Mutually beneficial relations with legislators	36	24,2	0,45	20	55,6
	C15	Mutually beneficial relations with the society	30	13,0	0,26	9	30,0
	C16	Minimization of the impact on the environment	33	49,8	0,76	28	84,8

Source: Compiled by author

The most important objectives and indicators that support that are Sustainable market value and High organizational performance (effectiveness) – that objectives refer to economic perspective of organization's operation. The second was Minimization of the impact on the environment – that objectives refer to ecological perspective of organization's. The third Mutually beneficial relations with the society was not mentioned as so important.

Conclusions

The management literature and practice is seeking the way to comply with growing number of standards and regulations, that's why the new frameworks and tools are published. The author goes along that trend and proposes The Sustainable System Management performance improvement model

During the research done either on management bodies of organizations or management experts that were confirmed that the examined organizations are seeking the frameworks to comply with requirements in the different areas including legal, social, economic or ecological environment that would allow to manage and measure the performance of the organization as system. The participants had declared that they would test the proposed framework.

The organizations that want to achieve a high level of efficiency should focus on three performance aspects: financial, social and environmental ones. The measurement of the performance in these three aspects in the long-term contributes to a success of organizations.

The identification of the key measurement criteria for the efficiency of management system and their taking into account at the design stage of the system are a tool to improve the organization in the sustainability context.

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Aneta WYSOKIŃSKA-SENKUS

ORCHID ID: 0000-0001-9021-6355

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TRAINING IN SHAPING EMPLOYEE INFORMATION SECURITY AWARENESS

Tomasz Stefaniuk

Siedlce University of Natural Sciences and Humanities, Faculty of Social Sciences, ul. Konarskiego 2 08-110 Siedlce Poland

E-mail: tomasz.stefaniuk@uph.edu.pl

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Abstract. The purpose of this paper is to present the effectiveness of training in the development of employee awareness in the area of information security. Two kinds of primary research were carried out: surveys conducted among employees of various organizations, the essence of which involved a comparison of the awareness level in terms of security among people who had participated and those who had not participated in information security training; and a comparative analysis of results of an audit of information security awareness conducted among employees of a large organization before and after conveying information security training. Research results showed significant effectiveness of training as a method not only of information security knowledge extension but also, and most importantly, one that has a significant impact on actual behaviors of employees in the studied area. Due to the fact that the greatest gap in security measures involves the lack of employee awareness, and because training is an effective method of shaping the said awareness, organizations should develop and implement an adequate training program raising the level of employee awareness in terms of information security. It should be remembered that the program cannot be a one-off event but rather a cyclical one. While the importance of awareness in information security is well described in the subject literature, there is a shortage of publications, which show a direct influence of training on employees' level of knowledge and behaviors in terms of information security. This paper, in an interesting, dual way, points to an actual impact of training both on expanding knowledge and on behaviors in terms of information security.

Keywords: information security; employee training; information security awareness (ISA)

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JEL Classifications: M12, M15, M53

1. Introduction

In the contemporary electronic knowledge-based economy, information has become a precious resource. Due to its value, it is a desirable good that a lot of institutions and private individuals try to obtain in an illegal way. An analysis of media reports concerning cybersecurity in recent years presents a truly gloomy picture of the contemporary world, where information faces great vulnerability to theft or destruction. Every year, the number

of cyber-attacks observed throughout the world is rising by close to 50%, as shown in the PwC report “Risk management in cyberspace” (PWC, 2015).

On the other hand, for many years now all research devoted to information security has been pointing to man as the main perpetrator of incidents threatening information security. It needs to be noted that as many as 70% of all information security abuse cases in Poland were committed by organizations’ employees (of which 48% by current employees and 22% by former employees (The Global State of Information Security® Survey 2015, PWC, p. 16).

Internal threats are considered more dangerous than external ones as their consequences lead to much greater damage and complications (Jabłoński, Mielus, 2010, p. 31).

It is people who are the weakest link in the information security system in organizations, actions directed at employees and subcontractors are crucial, as pointed out by a number of authors who rightfully emphasize that the mere technical measures are no longer sufficient to ensure information security in an organization (Vroom and Solms, 2004, Schultz, 2005; McCormac et al., 2017; Chehabeddine, Tvaronavičienė, 2020).

The above thesis is confirmed by a global information security research carried out by EY (2017) which shows that the greater blank in security measures involves the lack of employee awareness (2013 - 53%, 2014 - 57%, 2015 - 44%, 2016 - 55%) (EY, 2017). Therefore, developing appropriate employee behaviors in an organization plays no lesser role in the organization’s information security than any other technical measure (Jabłoński, Mielus, 2010, Kraemer et al., 2009).

As employee training is one of the ways to develop employee awareness in terms of information security, the aim of this paper is to specify the effectiveness of training in terms of building employee awareness in the sphere of information security.

2. Review of theory on the development of employee awareness in the sphere of information security

There is no single universal definition of information security awareness in the literature, yet two trends in interpreting this notion can be observed. Some authors bring down information security awareness to having knowledge about information security threats and ways to prevent them, i.a.: Banerjee and Pandey (2010); Banerjee et al. (2013); Chen et al. (2006); ENISA (2006); Okenyi and Owen 2007); Lim et al. (2010). In this meaning, the awareness level may be specified by the level of one’s knowledge and skill.

The other group of researchers points to the dimension of action. Therefore, information security awareness is the degree to which an individual (employee) not only understands the significance of IT security and knows IT security levels adequate to the organization and their individual security-related responsibilities but also acts accordingly. Such a position is adopted by i.a.: Shaw et al. (2009); ISF Standard (2007); Tsohou et al. (2015), Rotvold and Braathen (2008); Rastogi and von Solms (2012); Hellqvist et al. (2013).

As a rule, the second approach grades awareness levels making it possible to create models of measuring information security more precisely. Having information security knowledge is the initial (lowest) degree of awareness. However, the mere knowledge is not worth much if it does not imply adequate attitudes (belief that certain security measures must be taken and willingness to act). The final, highest expression of awareness involves adequate employee behavior (Figure 1).

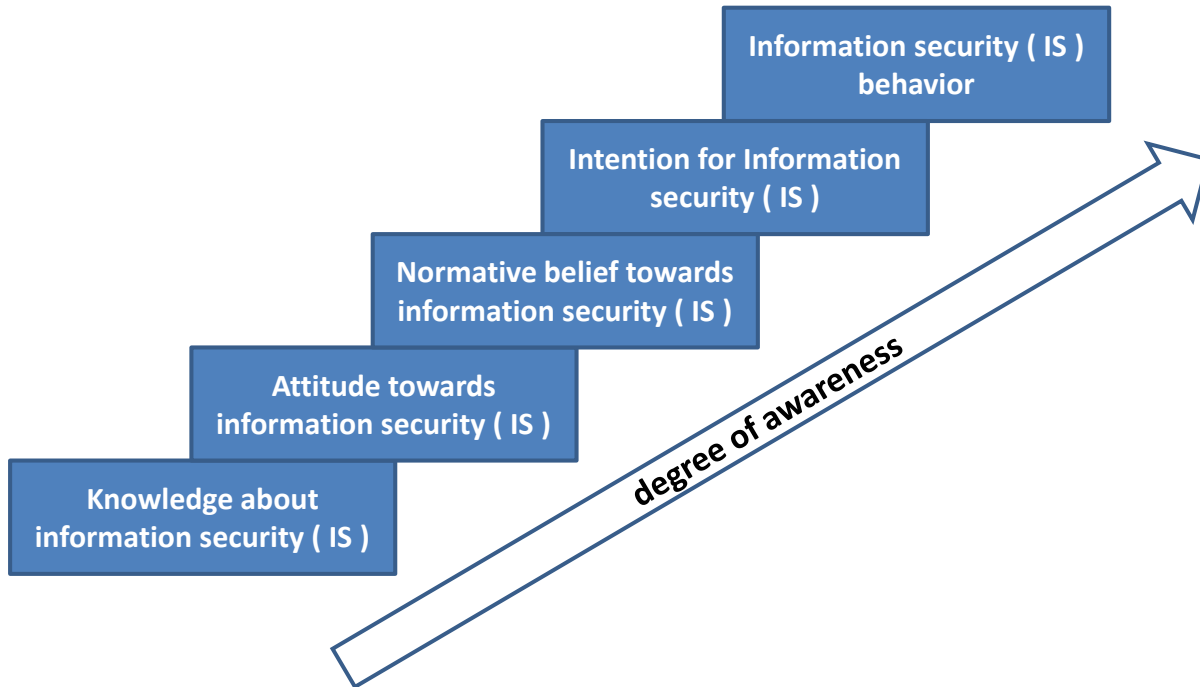


Fig. 1. Five-step ladder model for measuring information security awareness.

Source: Khan et al. (2011, p. 10864)

According to Data Security Standard (PCI 2014), directing the provision of appropriate materials to appropriate recipients in a swift and effective way is the key to effective raising of information security awareness. Both on the theoretical and the practical grounds, numerous methods of building information security awareness can be identified: traditional as well as ICT technology-based. The most frequently employed methods include (PCI, 2016, p. 5; Chmura 2017, pp. 80-86; Khan et al., 2011):

1. Classroom training (at a work place or in an external center). The main purpose involves providing an employee with a knowledge compendium (Kopier 2011) related to information security (policy and procedures in force in the organization, changes etc.) in a quick and effective manner.
2. Group discussion. It is a meeting of 15-20 people during which the participants fully draw from sharing knowledge and experience. There is no one-way communication in there. Information security-related issues are selected one by one and discussed, and all participants have equal opportunities to explain their points of view (Albrechsten and Hovden, 2010).
3. Newsletters. They are aimed at strengthening information security programs. They can be both in a paper and electronic form. They provide an opportunity to send numerous messages at the same time.
4. Video games – they stimulate information security knowledge, combine fun and training. They have significant impact on the change of the user's attitude, however they are not the best source of provision of detailed information on one's information security policy.
5. Video clips. The formula of this method makes it possible for the participants to learn whenever or for how long they wish as no time restrictions are imposed. However, they do not allow instructor-training participant interaction.
6. Poster campaigns. Placing posters in shared areas is aimed at drawing greater attention in a slogan-like way to specific steps (behaviors) that need to be taken in order to improve security.
7. CBT – Computer-based training.

8. Internet methods which include:

- a. dedicated websites, e.g. www.pcisecuritystandards.org,
- b. e-mail,
- c. blogs,
- d. animations and multimedia,
- e. social media,
- f. discussion groups,
- g. intranet.

Each of the above methods has their own virtues and flaws. For instance, electronic notifications are easier to read but also easier to ignore by busy staff. On the other hand, security-related events which require active participation of staff are exceptionally effective.

According to research carried out by B. Khan et al. (2011), the following feature highest effectiveness: group discussion and classroom training (5 and 4 in the five-point Likert scale, respectively). Effectiveness of training as a method of enhancing knowledge on user security is confirmed by literature review (Chmura 2017).

In turn, according to the PCI Standard (2014), the effectiveness of training in raising awareness is determined by the level of engagement and, indirectly, also by the size of the group of recipients taking part in it. Recipient engagement, implemented by scenario-based activities, solving case studies or focused discussion help ensure that the concepts are understood and memorized. Group size is correlated with engagement levels: the larger the group, the greater the risk that the content is not effectively communicated since individuals may lose focus on the presented material.

The communication channel used should match the audience receiving the training content, the type of content, as well as the content itself (PCI 2015). In turn, conducting security awareness training by way of many communication channels ensures that employees acquire and remember the presented information better.

As rightly noted by Ahmad et al., (2012), Balcerek et al., (2012) and Desman (2013), a properly planned and implemented ISA program fills the gap between end users and technology. As a result, ISA programs are becoming, perforce, a norm for organizational protection of end-user risk (Peltier, 2013; Tsohou et al. 2015; Vroom & Solms, 2004).

A number of international standards specify the implementation of an ISA program as a preliminary condition for constructing an effective system of information security management, for instance:

- *ISO/IEC 27001* (PN-EN ISO/IEC 27001:2017),
- *COBIT* (IT 2007),
- *Payment Card Industries – Data security* (ENISA 2007)
- *ISO 9001: 2000* (ENISA 2007).

Thus, if an organization or company wishes to obtain a certificate in one of these standards they must first implement a security awareness raising program.

3. Research objective and methodology

Dual primary research was carried out (Figure 2):

1. Between June 2018 and February 2019, a survey was carried out among 260 employees of various organizations (aged between 20 and 65), who were willing to improve their competences in terms of personal data protection. Fifty-five percent of them were men and forty-five percent were women. They represented organizations of various sizes: small organizations, employing fewer than 20 staff (28.8% of respondents), and organizations with over 200 employees (34% of respondents). The essence of this research involves a comparison of the level of awareness in terms of security among persons who have and those who have not participated in an information security training. The existence of a relationship between knowledge and actual behaviors of employees in the sphere of information security and participation in data security training was verified by means of the χ^2 test of independence according to formula (1).

$$\chi^2 = \sum_{i=1}^n \frac{(O_i - E_i)^2}{E_i} \quad (1)$$

Where:

O – observed value, E – expected value

Expected values were specified according to the following formula (2):

$$E_{expected} = \frac{(\text{sum of row}) (\text{sum of column})}{(\text{total sum})} \quad (2)$$

In order to investigate the impact of training on information security awareness Cramer's V contingency coefficient (3) was also calculated.

$$V = \sqrt{\frac{\chi^2}{n(m-1)}} \quad (3)$$

2. A comparative analysis of results of an information security audit conducted among employees of a large organization before and after information security training was carried out.

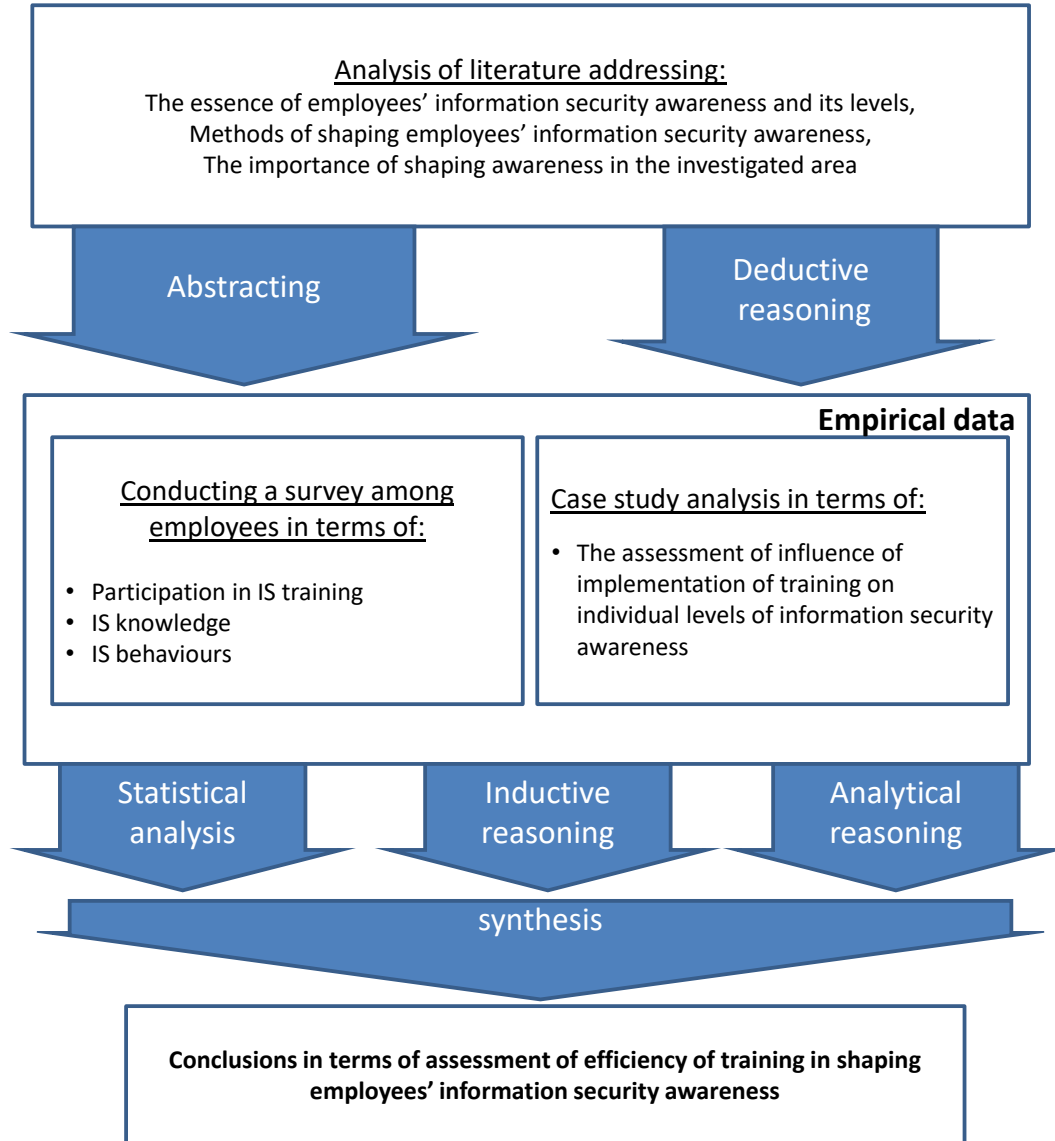


Fig. 2. Applied research process.

Source: author's own compilation

4. Research results

a. Analysis of survey results

When juxtaposing participation in training with the number of people employed in an organization, a marked difference between small companies and the rest of organizations can be observed. Only 20% of employees of small organizations have participated in information security training. Among larger organizations, the percentage of trained people was significantly higher, which was presented in Figure 3. The above trend could have been expected, however such a great discrepancy comes as a major surprise.

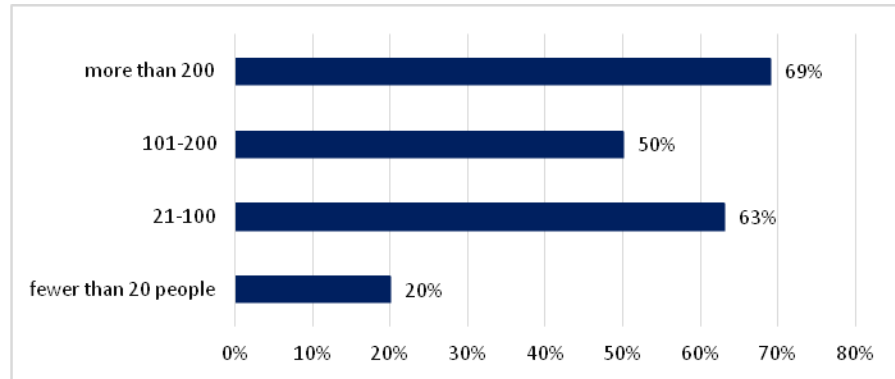


Fig.3. Percentage of people who have participated in information security training from the perspective of the number of people employed in a company.

Source: author's own compilation.

The first element investigated in terms of knowledge in the sphere of information security was familiarity with personal data processing processes. The ability to identify these processes – defining whether a performed activity is compliant with the applicable law or process of personal data processing – is key to the process of protection of this data. It implies the need to meet a number of obligations imposed on the processor in terms of protection of processed data.

As can be noted in Figure 4, persons who have participated in information security training over the last 2 years were able to identify personal data processing processes better than persons who have not taken part in such training.

Only 31% of people who have not participated in training correctly included deleting data as one of personal data processing processes, while in the group of persons who have been trained correct answers were given by 72% of respondents.

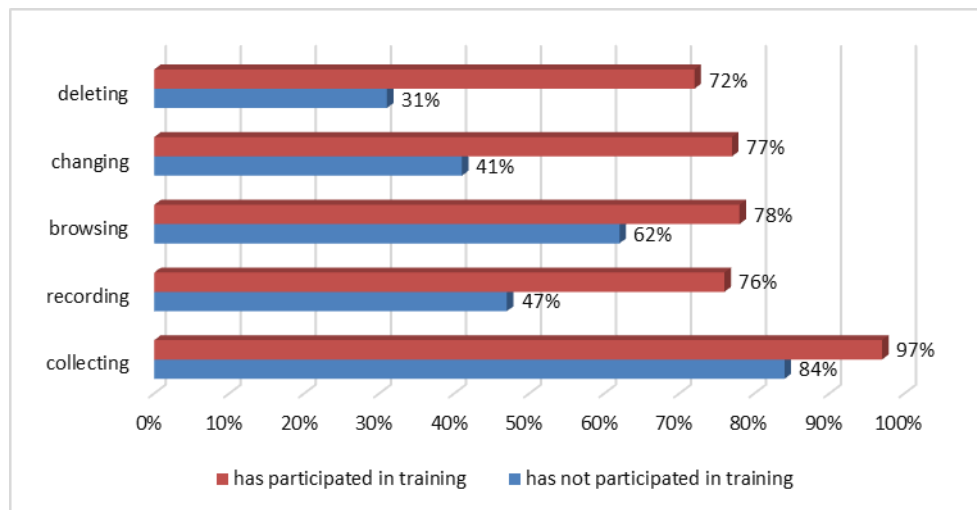


Fig.4. Identification of personal data processing activities by persons who have and those who have not participated in information security training

Source: author's own compilation.

The relationship between correct indication of a personal data processing process and participation in information security training was verified by the χ^2 test of independence according to formula (1). In order to investigate the impact of training on information security awareness Cramer's V contingency coefficient (3) was also calculated. Results are presented in Table 1.

Table 1. The relationship between correct indication of a personal data processing process and participation in information security training

Processing process	calculated χ^2	χ^2 for $\alpha=0.05$	χ^2 for $\alpha=0.005$	V_{cr}
collecting	8.61	3.84	7.87	0.24
recording	13.33	3.84	7.87	0.30
browsing	4.90	3.84	7.87	0.18
changing	21.32	3.84	7.87	0.37
deleting	25.83	3.84	7.87	0.41

Source: author's own compilation.

As you can see, for the significance level $\alpha=0.05$ there is a relationship between participation in training and correct identification of all personal data processing processes. With the significance level $\alpha=0.005$, the above correlation is significant for the processes of collecting, recording, changing and deleting. The specified Cramer's V contingency coefficient shows that the above correlation is moderately strong.

Analogically to the previous question, the difference between persons who have and those who have not participated in information security training could be noted in identification of personal data subject to special protection (the so-called sensitive data). Admissibility of processing special categories of personal data was limited in Article 9 GDPR in relation to regular data since their processing in the assessment of the legislator brings a serious threat to fundamental rights and freedoms. Under the Act of 29 August 1997 on the protection of personal data applicable in Poland before the GDPR, the catalogue of sensitive personal data included information concerning convictions, rulings imposing a penalty and fines, as well as other rulings issued in court or administrative proceedings. Article 9(1) GDPR excludes data on convictions or violations of the law (it does not list them) from the catalogue of sensitive data. Nevertheless, Article 10 GDPR points out that despite the exclusion of (not including) this data from the catalogue of sensitive data their processing must be based on the provision of domestic or Union law. As a consequence, these data are subject to special protection in Poland.

Only 14% of people who have not participated in training correctly pointed to a ruling imposing a penalty and information about fines as an example of sensitive personal data, while in the group of persons who have been trained correct answers were given by 53% of respondents (Fig. 5).

Also in this case the relationship between correct identification of personal data subject to special protection and participation in training was confirmed statistically. The calculated χ^2 value was 30. For the significance level $\alpha = 0.005$ and $df=3$, the theoretical value of χ^2 is 12.8. Cramer's V contingency coefficient was 0.44, which evidences a moderate strength of association between correct indication of personal data subject to special protection and participation in data protection training.

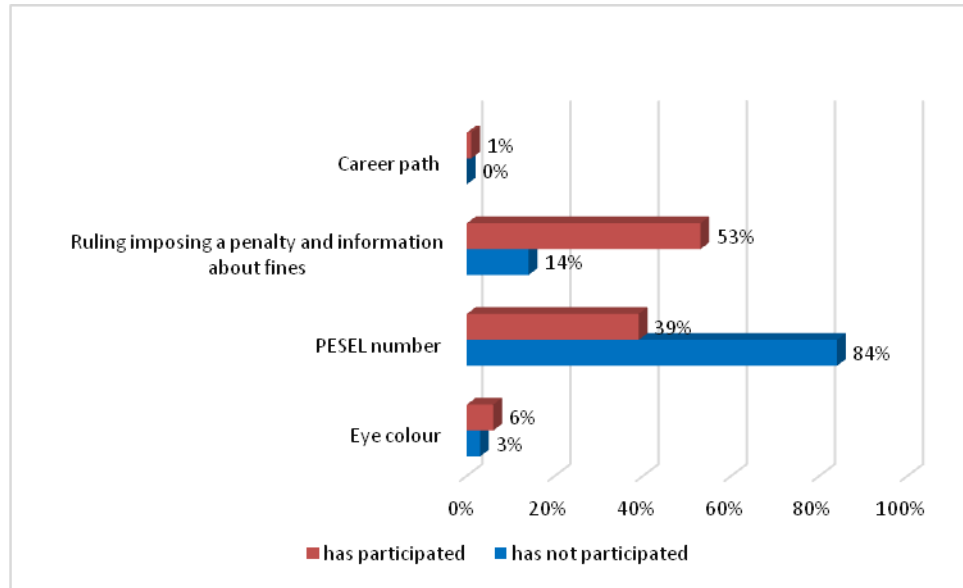


Fig.5. The correctness of indicating personal data subject to special protection among persons who have and those who have not participated in information security training

Source: author's own compilation

An analysis of responses confirmed great significance of training as a method of enhancing knowledge on information security.

Participation in training did not only broaden employee knowledge of information security but it also had a significant impact on actual employee behavior in this sphere.

As an example, one can point to the frequency of changing an email password among persons who have and those who have not participated in training. Almost 40% of employees who have not participated in information security training have not changed their email passwords. In the group of people who have participated in training this percentage is lower by almost a half at 20.4%. On the other hand, people who have participated in training prevail in the group of persons who change their email password, where the difference is more pronounced among those changing their password every 1-3 months. i.e. 16% and 5% respectively (Fig.6).

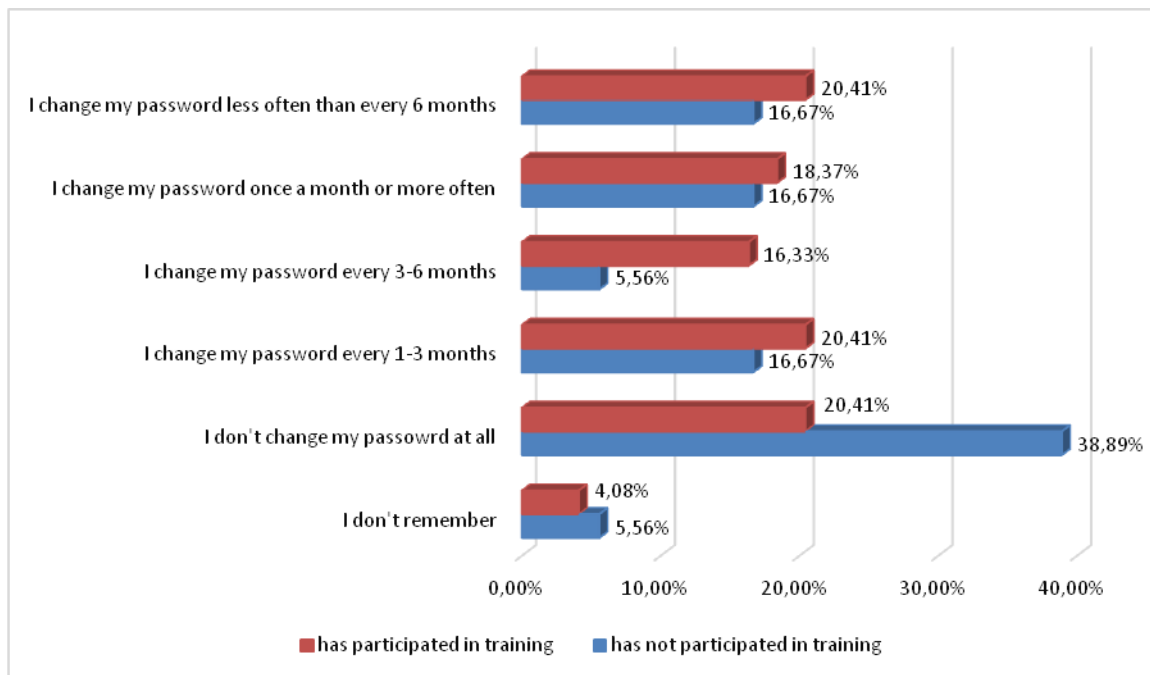


Fig.6. Frequency of email password change among persons who have and those who have not participated in information security training
Source: Author's own compilation

Also in this case the existence of a relationship between the frequency of password change and participation in data security training was verified by the χ^2 test of independence.

The result ($\chi^2=20$ with significance level $\alpha = 0.005$ and $df=6$) confirmed the existence of such a correlation. Cramer's V contingency coefficient (3) was also calculated. It was 0.36, which testifies to a moderate strength of association between investigated phenomena.

The second analyzed example of existence of a relationship between information security training and actual employee behavior involved having an authority to process personal data among employees declaring that they do process such a category of data. GDPR (Article 29 and 32(4)) imposes an obligation under which each authorized person (e.g. employee) who has access to personal data shall process it solely on instructions from the controller (e.g. employer). Even though the authority does not need to be given in writing, it still needs to be well documented. It can be included under the employee's responsibilities or possibly a separate template may be created.

As demonstrated by Figure 7, only 42% of persons who have not participated in training and who do process personal data have the authority to process it. In the group of persons who have recently participated in information security training, 80% of processors have the authority.

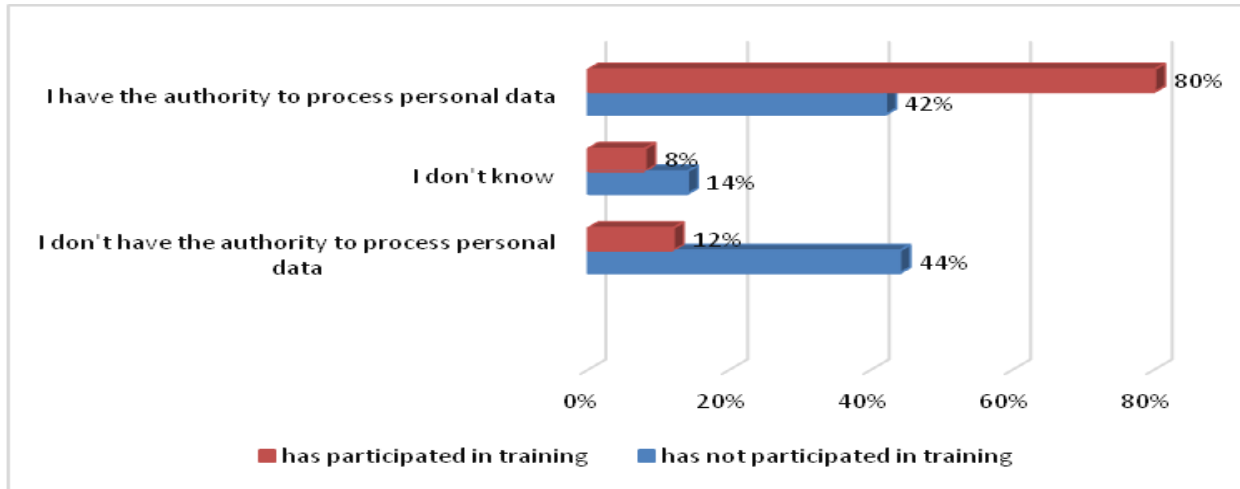


Fig. 7. Having authority to process personal data among employees processing personal data

Source: Author's own compilation

b. Analysis of audit results in organization x

The analysis of results of an audit of information security awareness led to similar conclusions as regards the significance of training as a method for extending knowledge on information security which also has a significant influence on the actual employee IS behavior.

Such an audit was carried out among employees of a large scientific and didactic organization before and after training employees in the area of information security. This study was conducted on 98 employees (10% of total employed).

Comparing results of both audits, a significant increase was observed in both the awareness of the fact that there is an information security management system in the organization (increase by 12%) and the fact of publishing the document "Information security policy" and making it available (increase by 18%).

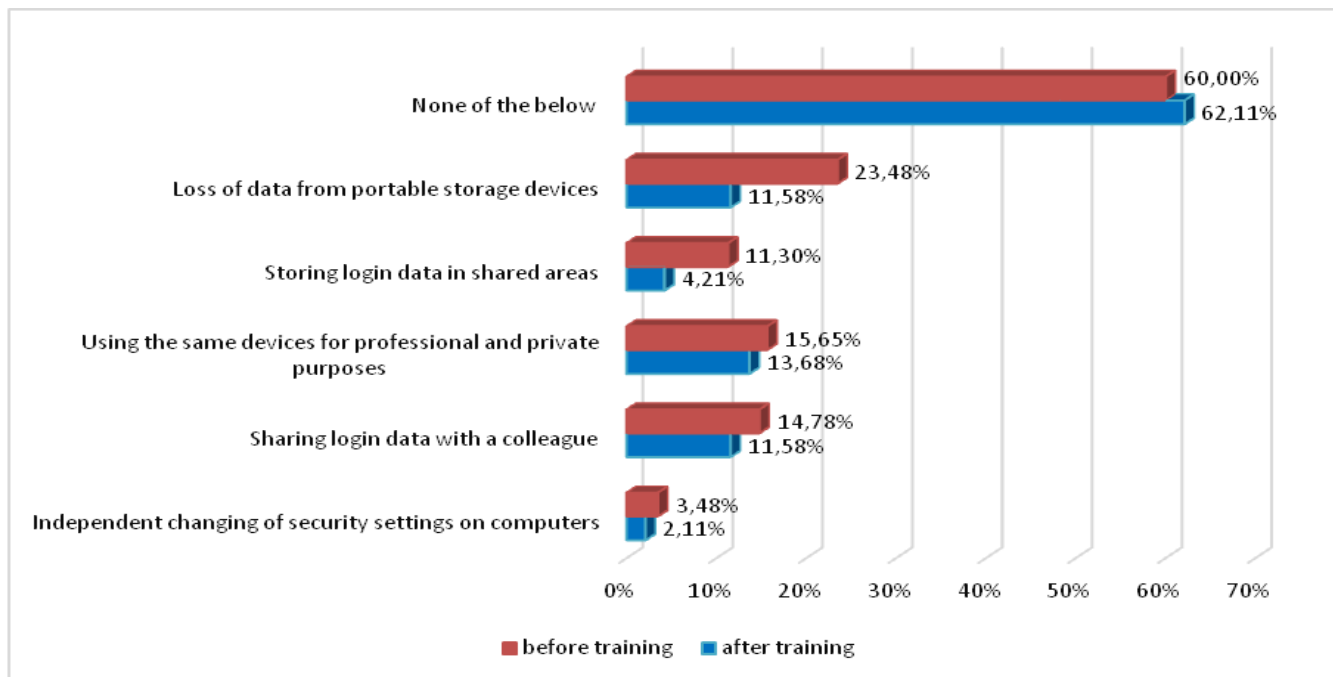


Fig. 8. Negative situations encountered by employees of the audited organization in their work

Source: Author's own compilation

The greatest increase was observed in employees' declarations as to their compliance with the principles and rules of the information security policy. In the study carried out after training, such a response was given by 70% of employees, whereas in the previous audit such a declaration was given by only 38% of employed persons.

However, what is more essential, following training a lower frequency of negative events in the sphere of information security was noted, i.e.: loss of data from portable storage devices – decrease by half from 23.48% to 11.6%, or storing usernames and passwords in shared areas – decrease from 11.3% to 4.21% (Figure 8).

Conclusions

As rightly pointed out by Hadlington (2017), each information security breach incident in an organization is more or less is determined not only by technology but also, and primarily, by people. Employees' improper conduct or lack of action lead to the majority of information security incidents. Therefore, employees' understanding of consequences of their behavior is key to the security of the organization's information and ITC systems.

Training is an effective method of shaping employee awareness in the area of information security. Research results have shown great effectiveness of training as a method of not only improving knowledge of information security, but mainly one that has a significant impact on the actual IS behavior of employees.

In order to minimize the risk of occurrence of information security incidents, organizations are obliged to develop and implement an adequate training program, which boosts the level of employees' awareness in the sphere of information security.

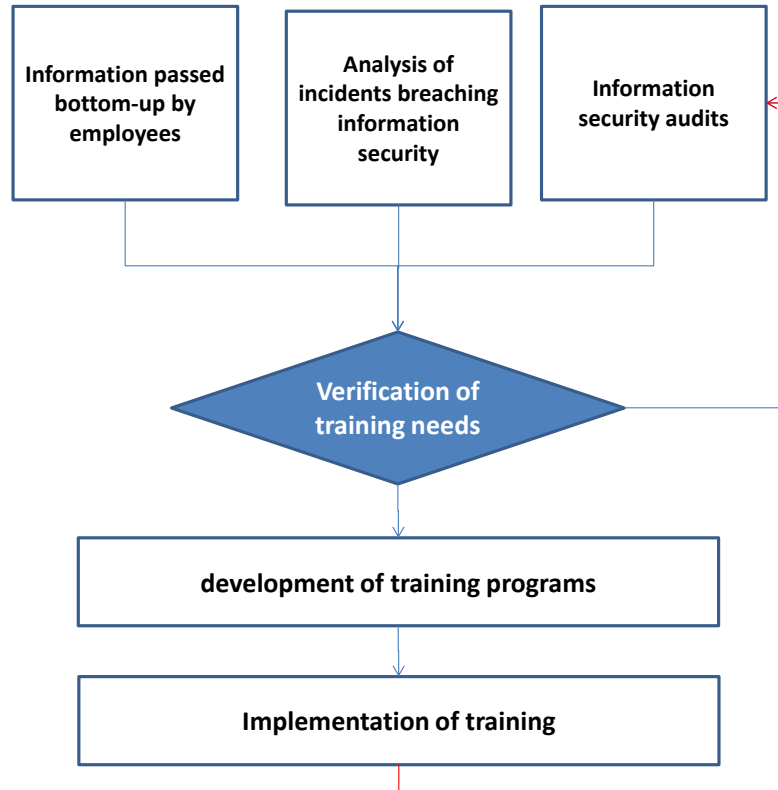


Fig.8. Information security training as a regular activity
 Source: Author's own compilation

One needs to bear I mind that this program cannot have a one-off form but should have a regular character instead. An audit in the area of information security or an analysis of incidents breaching information security in an organization may provide a starting point for the identification of training needs. Employees themselves may also flag up the need to undergo training in terms of information security (Figure 8).

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Tomasz STEFANIUK is the Assistance Professor of Siedlce University of Natural Sciences and Humanities, Specialist of information and communication systems security and ISO 27001 Lead Auditor. Research interests: information security management, management in a virtual environment, design and implementation of communication and information systems.
ORCID ID: [orcid.org/ 0000-0001-5769-8735](https://orcid.org/0000-0001-5769-8735)



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CHALLENGES OF ENTERPRISE RESOURCE PLANNING (ERP) IMPLEMENTATION IN AGRICULTURE*

Ivan Kulikov¹, Aleksandr Semin², Egor Skvortsov³, Natalia Ziablitchkaia⁴, Ekaterina Skvortsova⁵

¹All-Russian Horticultural Institute for Breeding, Agrotechnology and Nursery (ARHIBAN) Moskov, Zagoryevskaya str. d. 4, 115598, Russian Federation

²Ural State Economic University, Ekaterinburg, March 8 str./Narodnaya Volya st., 62/45620144 Russian Federation

³Ural Federal University, Ekaterinburg Mira str., 19, 620002, Russian Federation

⁴South Ural State University, Chelyabinsk, pr.Lenina, 76, 454080, Russian Federation

⁵Ural state agrarian university, Ekaterinburg, Karl Liebknecht str., 42, 620075, Russian Federation

E-mails: ¹vstisp@vstisp.org, ²aleks_ural_55@mail.ru, ³easkvortcov@mail.ru, ⁴econ10@rambler.ru, ⁵uralmash91@list.ru

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Abstract. The underlying assumption of the study is that ERP systems can crucially facilitate information exchange; yet, the agricultural sector is slow in their adoption due to different reasons, including a shortage of skilled personnel as well as a lack of knowledge about ERP capabilities among top managers and key employees. The study intends to identify challenges and prospects for ERP implementation in agriculture. The applied methods include the analysis of WoS publications and questionnaire surveys of executives of 55 companies operating in the Middle Urals' agricultural sector. ERP systems can be defined as comprehensive software solutions aimed to integrate business and management processes through a holistic approach and a single information system. According to expert estimates, in today's Russia the projects related to the agro-industrial sector account for 1-2% to 10-15% of the projects from the leading ERP vendors, including 1C, Bars Group, and Navigator-Agro. ERP systems in agriculture help improve business performance, reduce and monitor costs. These systems are effective in decision-making and can serve as the basis for precision agriculture. The main barriers are poor personnel skills and competencies, shortage of funds for ERP adoption, poorly developed or absent infrastructure, difficulties of fitting and adapting of ERP systems to agricultural business. In addition, agricultural business owners show no confidence in high-tech solutions and poor knowledge of the above systems. Other problems include operation complexity and insufficient government support in ERP implementation. The results of the study can be used by government authorities in their programs for innovative development and technical upgrading of the agriculture industry.

Keywords: ERP systems; agriculture; digital agriculture; resource monitoring; business activity planning

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JEL Classifications: O33, Q16, O32

Additional disciplines: digital economy, digital agriculture

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1. Introduction

In recent years, Russia has become increasingly interested in development of digital technologies. The adopted Strategy of Scientific and Technological Development of the Russian Federation till 2030 outlined priority objectives, including the transition to digital, intelligent production technologies and robotic systems in the next 10-15 years. The program is aimed to create adequate conditions and infrastructure, to train employees to achieve leadership in selected fields of scientific and technological development, to build an integrated national innovative system. The strategy will be implemented through the action plan, including mechanism and anticipated results, and the scientific-technical program for agricultural development till 2025. Adoption of digital technologies is hardly possible without respective tools, including enterprise resource planning (ERP) systems.

Adoption of enterprise application software by agricultural businesses is attracting increasing attention from business people and scholars; this interest has resulted in a growing number of scientific publications and is easy to understand: Enterprise software and enterprise resource planning systems, in particular, provide an essential tool for monitoring company resources and transactions with a single system (Davenport and Brooks, 2004).

ERP systems are standardized software packages and are based on industry best practices. In addition, ERP systems meet the demand for integrated solutions, replace outdated systems, help eliminate incompatible information systems and data redundancy, reduce maintenance costs and create a single platform for the business (Ross and Vitale, 2000).

Manufacturing resource planning (MRP II) systems that evolved from material requirement planning (MRP) systems developed in the 1970s were forerunners to ERP systems. MRP II tracks additional aspects of production, not addressed in the previous systems.

ERP systems, in their current form, came into use in the 1990s. The main difference between ERP systems and their predecessors is that ERP is designed to run the entire company and support all core business processes, while the earlier systems were focused on specific functions such as production planning and production-related operations (Haddara and Elragal, 2013). Since the 1990s companies have been adopting ERP systems to improve efficiency and to provide smooth and seamless flow of information across departments and functional units (Akkermans and Van Helden, 2002). Lately, on-premise ERP systems have been replaced by cloud-based or hybrid systems. Cloud computing is seen as the key strategic technology with massive growth potential (Peng and Gala, 2014), capable of changing the traditional way of using information technology in companies. Traditional ERP implementations are increasingly giving way to cloud-based ERP systems, which are steadily gaining popularity (Bento et al. 2015).

It should be noted that implementation of ERP in agriculture has not been sufficiently studied both in Russia and other countries. Agricultural businesses find it difficult to adopt ERP systems due to lack of scientific research, insufficient feasibility study of ERP implementation and benefits, lack of adoption guidelines, and lack of consistent training of employees on using ERP software in agriculture. This provides the rationale for study.

2. Problem setting and analysis of approaches to the solution

The primary assumption is that ERP systems can significantly improve the operational efficiency of an agricultural company; however, their low adoption rates are caused by a number of problems, including a shortage of skilled personnel as well as a lack of knowledge about ERP capabilities among top managers and key

employees of agricultural companies.

The study was conducted in several steps. The first step included analysis of publications addressing the evolution of ERP systems. The review of literature was performed by using a systematic approach. We analyzed the Web of Science reference database by contents of articles published within the last 5 years. When screening literature, we analyzed texts to check if the articles had any relation to our study. As a result, we selected the most relevant and significant publications in peer-reviewed journals. The remaining articles did not have any relation to the problem under study, as they addressed ERP systems and agriculture indirectly, thus being rejected and not subject to further reading and analysis.

The second step involved questionnaire survey of top managers and key employees of agricultural companies operating in the Sverdlovsk Region. The questionnaire contained closed-ended questions. At the end of the questionnaire, respondents were offered to give examples of using ERP systems in agriculture. The survey allowed us to identify the awareness level of agricultural top managers regarding ERP systems as well as to assess their expectations and possible challenges in implementation of ERP systems. The survey was conducted among top managers and key employees of 55 agricultural companies in the Middle Urals. The average age of respondents was 48; 87.3% were male and 12.7% were female. Most of the respondents (76.4%) are employees having university education; out of them, 12.7% have a bachelor's degree, 9.1% have a master's degree, and one respondent has a candidate of sciences degree.

For the final step we used SWOT analysis tools to assess the status and prospects for ERP implementation in the agricultural industry. We were able to identify strengths and weaknesses, to evaluate opportunities and threats associated with ERP implementation in agriculture.

The study is aimed to identify challenges and prospects of using ERP systems in agriculture. The academic novelty includes the identification of the most preferred areas of application of ERP-systems according to farmers (by the example of the Middle Urals), as well as the expected benefits and an estimated increase in the profitability level of production and the main barriers at applying of these technologies in agriculture. Research restrictions concern participation in the survey of farmers directly engaged in agricultural production without involving large holding structures which deal with product processing.

The results of the study can be used by government authorities in their programs for innovative development and technical upgrading of the agriculture industry.

3. Application of ERP systems in agriculture

The factors that can facilitate ERP adoption by agricultural companies are as follows: Farmers need to have a clear picture of raw material prices and exchange rate fluctuations, to manage production costs, and to deal with challenges of climatic changes to comply with the present-day requirements.

Implementation of ERP systems is a complex organizational and technical process. Technically, these systems are difficult to implement in terms of configuration, adaptation and conversion of the data from outdated systems.

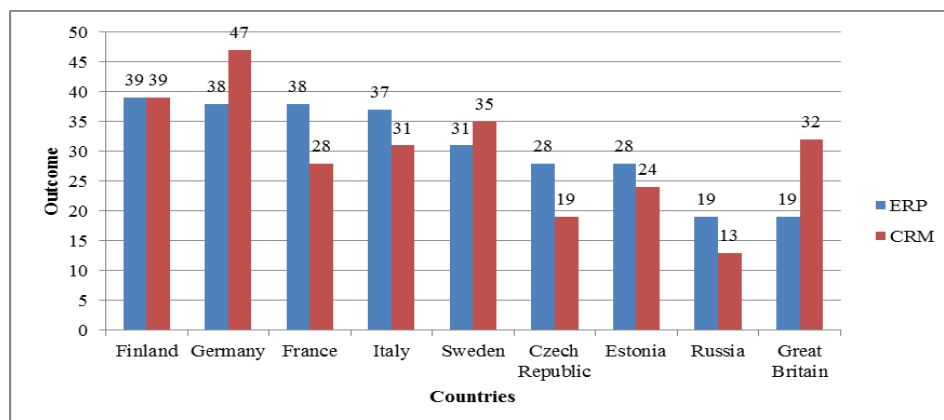


Fig. 1. ERP and CRM implementation by country: 2017* (as a percentage of the total number of businesses)

*Source: (Abdrakhmanova et al. 2002)

The above figure 1 shows that in 2017 Finland, France and Germany accounted for the highest percentage of the companies using ERP systems, Russia lagging far behind in implementation of ERP systems.

The process of ERP implementation brings about changes in business processes, work procedures, employees' roles and responsibilities. Besides, as ERP systems are elaborate and sophisticated, agricultural employees may find it difficult to understand and study them; therefore, they may need comprehensive training and refresher programs (Robey et al. 2002). Integrating all functions into one system, agricultural businesses intend to improve the efficiency by providing employees of different departments with an access to the same information through the shareable database. ERP systems are of fundamental significance for operation and supply chain management through seamless integration of processes, real-time access and data access, helping maintain competitive ability on global and local markets.

ERP systems can be defined as comprehensive software solutions aimed to integrate business and management processes through a holistic approach and a single information system (Costa et al. 2016; Klaus et al. 2000). ERP can be seen as an integrated system for automation of the flow of materials, information and financial resources by their integration in business processes (Vlasov et al. 2019, Acar et al. 2017).

According to expert estimates, projects related to the agriculture industry account for 1-2% to 10-15% of the projects from the leading software and hardware systems vendors. For example, out of 105 systems in the registry of 1C-Parus, only 4 systems are used in agriculture. In the registry of the BARS Group the ratio of total number of projects and projects serving the needs of the agriculture industry is 84 to 9, etc. In total, the registry includes more than 450 agriculture-related projects implemented by over 300 companies. In addition to traditional (not only for agriculture) accounting and ERP systems (1C (1C: Enterprise. 2019), BARS Group (BARS Agriculture. 2019), etc.) as well as security and monitoring systems (Navigator-Agro (Navigator – Agro. 2019), there are pilot GIS projects intended to meet needs of the agro-industrial sector (Centerprograms system (Industry Solutions. 2019) and Rostelecom (Rostelecom. 2019). To be fair, in their agriculture-related software solutions, leading Russian vendors and integrators did not go far from traditional and widely used inventory control systems.

Examples of ERP systems include databases related to weather changes, pest infestation and crop diseases as well as other production outcomes combined with data on prices for agricultural products. All the above can provide useful information for management decision making, which requires a database, data warehouse and data mining (Wolfert et al. 2017). ERP systems play an important role in development of precision agriculture. The data obtained through the above technology can be integrated into a harmonized system of agriculture management, including using the Internet of Things (Rao et al. 2012; Kaloxylas et al. 2012; Li et al. 2011)

To a great extent, the efficiency of ERP systems depends on the field of application as well as on top managers' and employees' confidence in these systems (Mayeh et al. 2016). In the meantime, there is quite conflicting information about ERP benefits and their impact (Nwankpa, 2015). A number of scholars argue that less than 49% of the ERP implementations are successful worldwide due to ERP complex nature (Mahmud et al. 2017). By studying determinants of ERP diffusion we can identify factors contributing to improved performance of agricultural companies that adopt ERP systems. The preliminary findings show that implementation of these systems can help agricultural companies/farmers improve their financial performance.

The ERP implementation process can be generally broken into the following steps:

- mapping out automation strategy;
- business performance analysis;
- organization restructuring;
- selection of a system;
- adoption of the system;
- operation.

Top managers' and key employees' assessment of prospects for ERP implementation in agriculture is of great importance. Expectations and awareness levels were identified through the survey conducted among top managers and key employees of agricultural companies.

Measuring of the amount of data received by top managers and key employees of agricultural companies from sensors, transmitters and other digital devices incorporated in ERP systems is of great importance (Fig. 2).

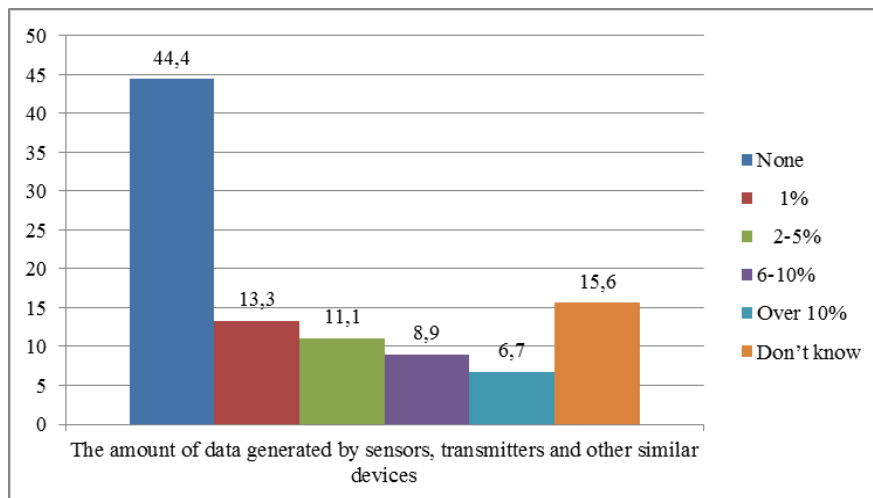


Fig. 2. Data received from sensors, transmitters and similar devices

Source: authors, the respondents' opinion

The survey shows that 44.4 % of top managers and key employees of agricultural companies do not use sensors and transmitters to obtain data. 15.6 % of the respondents were at a loss to answer the question. Only 6.7 % of the respondents said that they received more than 10% of the data from digital devices.

In our identification of ERP implementation drivers in the region's agriculture we relied on technologies that had been adopted or were under development. The most likely fields for ERP implementation in agriculture were determined based on the findings obtained at the previous step of the study. The respondents were offered to give their own answer, if ERP implementation was not included in the available answers (Fig. 3).

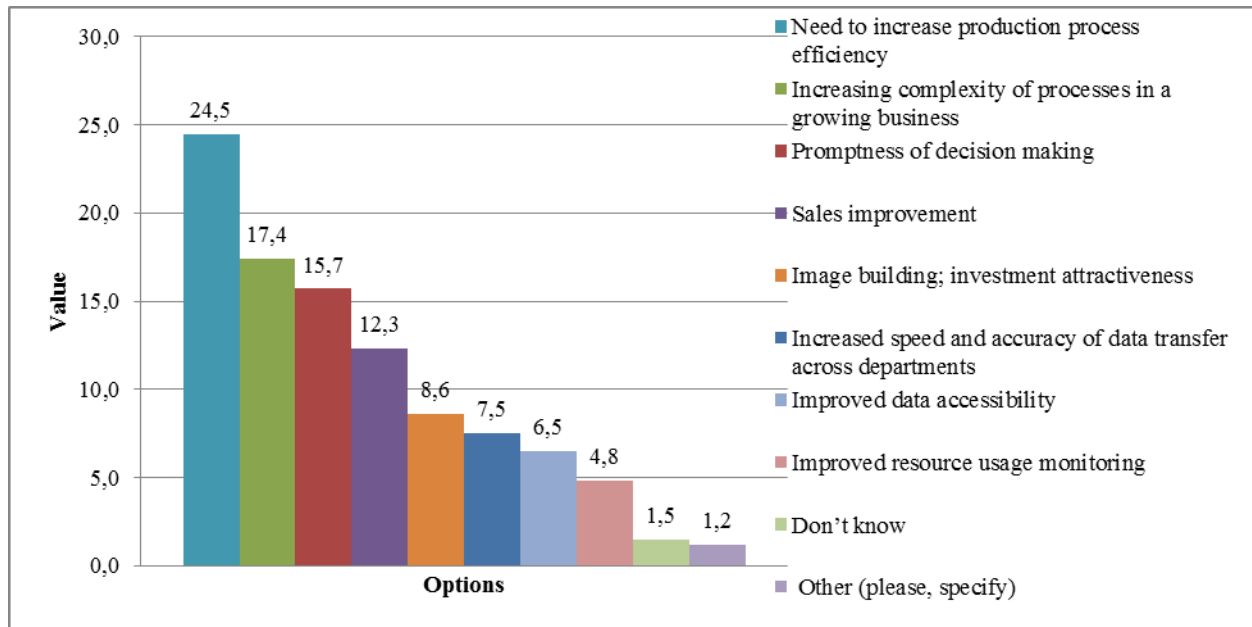


Fig. 3. Drivers of ERP implementation in agricultural companies – the respondents' opinion, *Source:* authors

Most of the respondents (24.5 %) agree that ERP implementation can increase production process efficiency. Substantial interest (17.4 %) is generated by ERP implementation necessitated by increasing complexity of processes in a growing business. Quite a few respondents (12.3 %) were interested in prospects for improving sales through better information exchange between the production and sales departments.

Unexpectedly, the need to increase speed and accuracy of data transfer across departments did not arise any particular interest among the respondents (7.5%). Adoption of ERP systems can improve transparency of a company, thus boosting its investment attractiveness (8.6%). The preferences of top managers and key employees of agricultural companies depend on organizational, economic, natural and other operation characteristics typical of the region; therefore, they need additional studies.

The ERP post-implementation benefits expected by the respondents – top managers and key employees of agricultural companies are shown in Fig. 4.

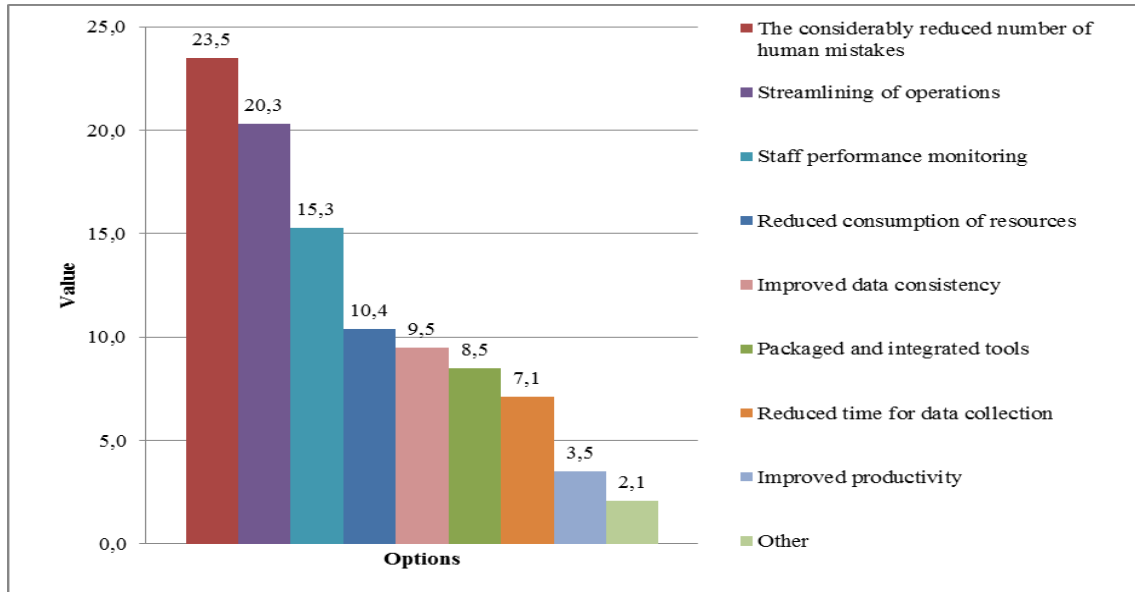


Fig. 4. Expected benefits of ERP implementation, Source: authors

The respondents expect that ERP implementation will help reduce human mistakes (23.5 %), optimize the processes (20.3 %), improve human resource management (15.3 %). The expectations are also connected with improved data exchange (9.5%). Quite a few respondents (15.3%) are interested in improved staff performance monitoring.

A significant number of respondents (39.4%) pointed out that ERP systems would help increase revenue and profitability; 18.5% of the respondents expect that ERP systems will increase profitability by 5-9%; 8.5% of the respondents believe that it will increase by over 20% (Fig. 5).

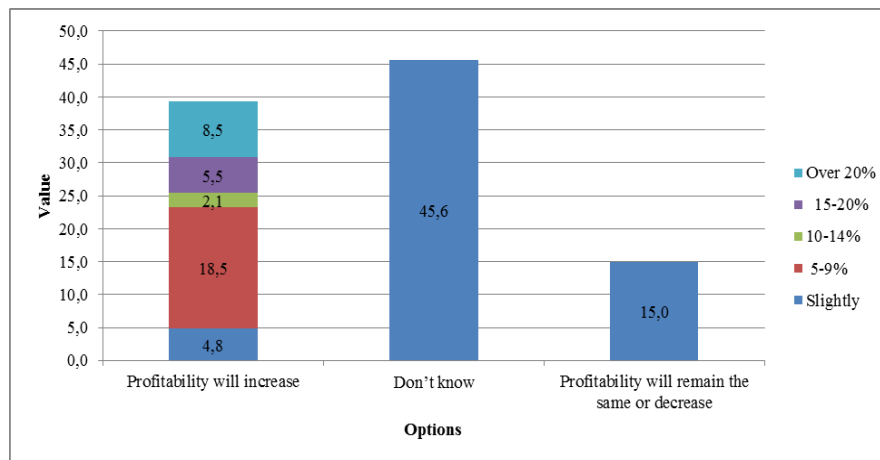


Fig. 5. Expected profitability increase resulted from ERP implementation in agriculture, Source: authors

In the meantime, the survey shows that quite a large number of respondents (15.0%) are skeptical about ERP systems or find it difficult to answer the question (45.6%). Apparently, it can be explained by the novelty of the ERP technology as well as by poor awareness of ERP implementation impact.

Implementation of ERP systems in agriculture can encounter a number of barriers and natural constraints. In the opinion of top managers and key employees of agricultural companies, the main problems are lack of trained and skilled workers capable of operating ERP systems (26.5% of the respondents) and lack of funds (23.6%). Note that the implementation costs can range significantly – from several thousand rubles for a suite to hundreds and millions of rubles (Fig. 6).

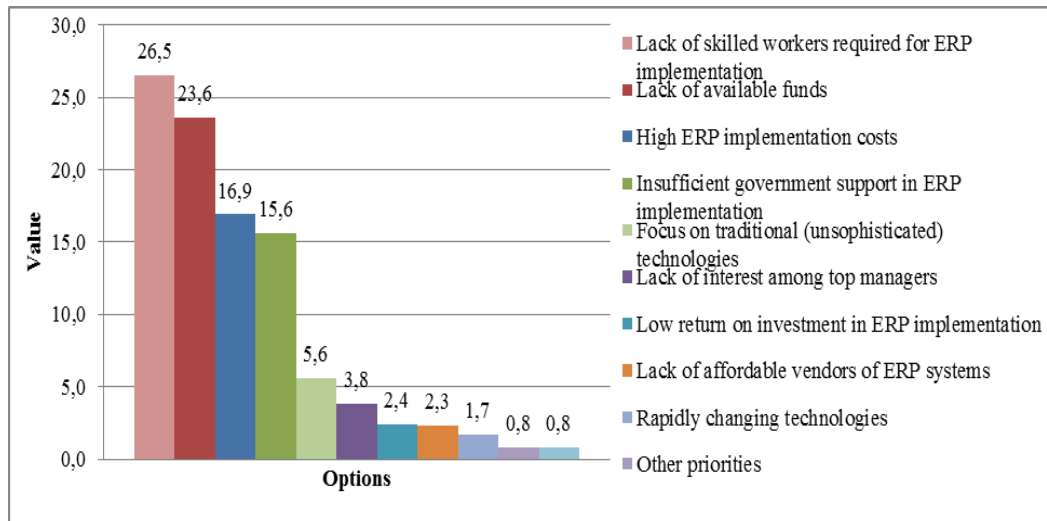


Fig. 6. Main barriers and challenges in implementation of artificial intelligence technology in agriculture, Source: authors

Quite a few respondents (16.9%) pointed out high costs of ERP implementation and insufficient government support. The Russian government gives priority to subsidies aimed at development of dairy and beef farming, crop production, equipment and machinery procurement, etc. Complex innovative technologies, including ERP systems, are not subject to government support. Furthermore, a large number of ERP components and parts are available only from foreign manufacturers and vendors, which makes it difficult to reimburse implementation expenses.

ERP implementation in companies needs building a project team and engaging third-party contractors. However, insufficient skills and competencies of vendors, as pointed out by 2.3% of the respondents, impede significantly the above process. Control systems for agricultural businesses are intended to integrate most of the technologies into a single software and hardware system. The dominant place is still taken by accounting or packaged ERP solutions. Lately, there have been comprehensive solutions tailored to specific needs of the agriculture industry. For example, the ExactFarming Company came up with the solution for real-time field monitoring and agricultural production management. The ANT Company has designated projects in crop farming both for private and public entities. In the last 2-3 years, a number of agriculture-specific solutions have been offered by Borlas, a well-known integrator (systems for process monitoring, systems for crop planning, accounting and analytics portals for poultry farms, etc.).

Implementation of systems intended to automate management and operation of agricultural businesses encounters a number of problems in Russia. One of them is lack of business owners' confidence in high-tech solutions, which translates into insufficient support of projects from corporate management and makes projects difficult to implement. The departments' reluctance to share confidential information has an adverse impact on the efficiency of the system. Other adverse factors include insufficiently trained personnel, problems related to timely data entry and accuracy maintenance in ERP systems.

By using the SWOT analysis we can assess the process of ERP implementation in agricultural companies. We should point out that ERP systems are difficult to fit into and get adapted to Russian conditions as well as to conditions of a specific company. Unlike off-the-shelf packaged software, ERP systems fall into the category of custom-built software requiring time-consuming adjustment and reprogramming of individual components to make them fit for further usage (Table1).

Table 1. SWOT – Analysis of ERP Implementation in Agriculture

Strengths	Weaknesses
Improved performance and reduced costs due to ERP implementation	Lack of available funds for ERP implementation
Cost control	Using outdated programs in training of employees in industry-related educational institutions; insufficient competencies in ERP implementation in the agriculture industry
Development of the resource planning system in agricultural companies	Poorly developed or absent infrastructure; difficulties in adjustment and adaptation of ERP systems
Foundation for implementation of technologies used in precision agriculture	Employees' and departments' reluctance to adopt ERP systems
Opportunities	Threats
Rapid development of digital technologies for agriculture	Lack of confidence in high-tech solutions from agricultural business owners
Integration with consumers of food products makes it possible to monitor changes in consumer behavior	Insufficient government support and funding in ERP implementation
Development of programs for industry digitalization; increased interest from the top management	High prices for ERP systems; difficulties in measuring ERP commercial performance
Availability of ready-made ERP solutions for agriculture	Poor awareness of ERP systems among agricultural producers

Source: authors

On the other hand, while analyzing different ERP systems, we came across a number of open source business solutions where the ADempire, as we believe, takes the lead. The system was developed by the team consisting of more than 30 people and includes around 20 modules automating core business processes.

Conclusions

The study addresses prospects and challenges associated with ERP implementation; the priority attention is given to adoption and implementation of ERP systems in agricultural companies. We have attempted to identify key factors having an impact on the process of ERP implementation in the agriculture industry.

Top managers and key employees should set specific criteria to measure the ERP post-implementation efficiency so that the feasibility of these systems could be assessed. In our opinion, ERP systems will help improve accuracy of management decisions in agriculture and will lay the foundation for precision agriculture.

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Ivan KULIKOV - Doctor of Economics, digital economy, smart garden, gardening, import substitution, convergent technologies, local monitoring, local garden

ORCID ID: 0000-0001-8071-0931

Aleksandr SEMIN - Doctor of Economics, Professor Scientific interests: concentrated in the field of organizational and economic mechanisms for the reproduction of qualified agricultural personnel, as well as the technical potential of agricultural production; an effective mechanism for budget support of business entities in the agricultural sector; strategic planning and management.

ORCID ID: 0000-0001-8270-2257

Egor SKVORTSOV - PhD in Economics, research interests: development of the economic mechanism for applying digital technologies, agricultural robotics, development of the organizational and economic mechanism for sustainable land management based on modern digital technologies,

ORCID ID: 0000-0003-2034-951X

Natalia ZIABLITCKAIA - Doctor of Economics, Professor Scientific interests: business planning, competitive advantages of the organization, lean manufacturing, development of petrochemical clusters, petrochemical industry.

ORCID ID: 0000-0001-5768-1546

Ekaterina SKVORTSOVA - teacher, research interests: agricultural economics, robotics, digital technologies, agricultural labor, human capital.

ORCID ID: 0000-0001-9341-4453

Register for an ORCID ID:

<https://orcid.org/register>

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A DIAMOND MODEL BASED ANALYSIS FOR IMPROVING THE SUSTAINABLE COMPETITIVENESS IN EDUCATIONAL EXPORTS BY CHINESE COLLEGES AND UNIVERSITIES*

Yingfei Yang ¹, Michal Fabus ², Ki-Hyung Bae ³, Mengze Zhang ⁴

¹Sejong University, 209, Neungdong-ro, Gwangjin-gu, Seoul, South Korea

¹Ningbo University of Finance & Economics, No. 899, Xueyuan Rd, Haishu District, Ningbo, Zhejiang, People's Republic of China

²School of Economics and Management in Public Administration in Bratislava, Furdekova 16, 85104 Bratislava, Slovak Republic

^{3,4}Sejong University, 209, Neungdong-ro, Gwangjin-gu, Seoul, South Korea

E-mails: ¹yangyingfei@nbufe.edu.cn; ²michal.fabus@vsemvs.sk; ³baekh@sejong.ac.kr; ⁴allen.mengze@foxmail.com

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Abstract. Nowadays, as one of the most important part of international trade, Service trade also affects the economic development of each country in the world. Although China's Educational exports have increased year by year, there are still trade deficits due to some reason. This paper mainly focuses on the local colleges and universities, and analyse the factors affecting the international sustainable competitiveness of the education exports of these institutions, based on Porter's national diamond model. And Finally, It put forward an effective way to enhance China's international sustainable competitiveness in the educational service market.

Keywords: Education Exports; National Diamond Model; Sustainable competitiveness; Local Colleges and Universities.

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JEL Classifications: F14, I23, L89, O53

1. Introduction

1.1 Background and the significance of the research topic

With the ever-growing trend of globalization in politics, economy, and lifestyles, so is the pattern of exchange of educational resources among countries as the domestic educational market of various countries is gradually

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opening up to the outside world. Education export, as one of the essential components of service trade, can bring great economic benefits to a country, as well as serve as a new growth point to further promote the country's economic development (Girdzijauskaitė et al., 2019). In addition, it can enhance a country's political and cultural exposure and influences on the international stage, and act as an important driving force for the cultivation of talents and scientific and technological progress.

At the same time, education exports can also be the necessary stimulant to the education industry itself, promoting the overall level of globalization of education and improving the international sustainable competitiveness of the industry.

Compared with developed countries worldwide, China's education exports are lagging far behind the norm. It has the world's largest trade deficit in education services and is the world's largest importer of education. As a result, its education exports are in a very disadvantageous position in the highly competitive international market. At present, in terms of the composition of China's higher educational institutions, the proportion of local colleges and universities exceeds 90%. Local colleges and universities have now become the core of national higher education, and the performance of its education exports directly affect the overall level of the international competitiveness of China's education industry. Therefore, research studies on how to strengthen the education export sustainable competitiveness of these local colleges and universities are of great significance. The results would definitely lead to the improvement of China's higher education exports and enhance its international sustainable competitiveness.

1.2 Innovations and deficiency of research

In recent years, the internationalization of higher education has become an increasingly difficult issue to deal with, and hence a hot research topic. This paper focused on the field of education export, which is relatively difficult to quantify due to the lack of data, and as a result, its finding has certain innovation in enriching the research in this field.

In addition, this paper adopts the analysis method of econometric model, and incorporates, on the basis of Porter's National Diamond model, new microscopic variables into the empirical model. This approach makes this research framework more three-dimensional and ideal, when compared to the traditional analysis where only macroscopic factors are considered.

However, due to the inherent difficulties involved in the data acquisition and selections on the education exports of the local colleges and universities, there may exist some deficiencies, which may lead to certain deviations of the research findings.

2. Literature review

2.1 Current Domestic Research Status

In light of China's outstanding education service trade deficit, many domestic scholars have begun to pay attention to the issues concerning the export of higher education and put forward various strategies to enhance the sustainable competitiveness of its education industry in the context of globalization. The efforts mainly focused on the following aspects:

(1) On the theory of sustained competitive advantage.

Zuo Shixiang (2016) believes that changes in core resources, core competencies and the external environment are key factors in determining China's participation in international trade in education services.

(2) On the analysis of competitiveness indicators.

For instance, Wang Feng and He Yixiao (2014) believe that the main indicators embodying the competitiveness of education exports are the Trade Competitiveness Index (TC), the indicative Comparative Advantage Index (RCA) and the indicative Competitive Advantage Index (RC); while Shi Jie (2012) thinks the International Market Share indicator (IMS) plays a crucial role in measuring a country's educational export competitiveness.

(3) On analysis on factors impacting the competitiveness.

Some scholars conducted studies on the main factors affecting China's education services trade, based on Porter's "National Diamond Theory" (Liu Xin, 2007; Chen Xi, 2015; Jin Niu, 2016). While others mainly relied on quantitative analysis approach to study the main factors affecting the service trade in higher education (Lu Xin, 2013).

(4) On analysis on regional and national competitiveness.

These studies mostly focused on developed countries, ASEAN countries (Sun Weike, 2013), Japan and South Korea (Zhai Guiyong, 2007), and countries along the "Belt and Road Initiative" economic corridors (Wen Sijun & Qi Liangliang, 2016).

2.2 Current research status

(1) On the study of education services trade.

The study of educational service trade by foreign scholars and research institutions can be traced back to Marx's exposition of "education", which is also rich in theoretical research results. The contributions of Adams Smith and David Ricardo to international trade theory are the theoretical cornerstone of all types of trade research (Adam Smith, 2014; David Ricardo, 2014).

Some scholars have carried on the deep interpretation to the education service trade part in the GATS clause and analyzed the effects of GATS to the higher education as well the main role transformation of governments and students (Knight, 2002).

(2) On the study of factors influencing the competitiveness of educational services.

Such as Michael Porter (2008). This paper analyzed the import and export of education in the United States from the cost and benefits perspectives and put forward the core elements that affected the competitiveness level of American education service trade.

Also, the Organization for Economic Co-Development (OECD) (2009), on the basis of analyzing the educational development of OECD member countries and other nations' trade in education services, pointed out that the main factors affecting students' choice of overseas study destinations are language, tuition fees, immigration policies, etc.

3. Methodology

3.1 Theoretical analysis

3.1.1 The definition of concepts

The basic definition of local colleges and universities

The local colleges and universities in this study refer to those full-time institutions whose funding sources are primarily local government and private resources, and whose main service target is the local economic development and social progress. This definition includes the ordinary undergraduate colleges and vocational schools. According to list of national colleges and universities published by the Ministry of Education, as of May 31, 2017, China has 2631 national general institutions of higher learning (which include 1243 undergraduate colleges, and 265 independent colleges); of which, there are a total of 195 subordinate colleges and universities (190 undergraduate units, and 5 specialized units).

The definition of education export

The General Agreement on Trade in Services (GATS), which was enforced in 1995, defines four modes of delivery of trade in services, namely, cross-border delivery, cross-border consumption, commercial presence, and

movement of natural persons. Of the 12 classifications of trade in services, the 5th category - the trade on education - can be further divided into education exports and education imports. The term "educational export" is interpreted as being engaged in such actions such as a Member State accepting foreign students, or going abroad to manage an institution, either independently or jointly with other entities, for the purpose of acquiring certain economic benefits. At present, China's educational exports concentrated in the area of providing services for international students; other forms of export, such as overseas schools and cross-border distance learning, accounted for a relatively insignificant proportion of the total education export, generally lacked definitive data and information. Therefore, the current study is primarily oriented toward education exports concerning international students. That is, the level of foreign students' acceptance is the main indicator of education exports for the current research.

The definition of the competitiveness of education export

Competitiveness is generally understood as a competitive ability, relative to a competitor's comparative advantage or strength. At present, there is a rather authoritative viewpoint internationally on the study of competitiveness, presented by Michael E Porter. He believes that "competitiveness is the comprehensive quality of a country or a region in which an industry is able to provide products or services to the market more effectively than similar industries in other countries or regions." The introduction of this concept into trade in education services means that the competitiveness of educational exports can be defined as the ability of trade subjects to engage in educational export activities in various environments in the form of trade provided for in GATS, encompassing both the competitiveness among schools (educational institutions) and that resulting from external environmental influences.

3.1.2 Porter's National Diamond Theory

In the eighties and the nineties of the 20th century, Michael Porter, a professor at the Harvard Business School in the United States, combined businesses, industries and countries in his published work "Competitive Trilogy - Competition Strategy, Competitive Advantage and National Competitive Advantage." He used the so-called "National Diamond Model" to explain the reasons why certain countries have gained an advantage in the international competition of industry. In his view, the key factors that determine this international competitiveness can be divided into four main categories, namely, production factors, demand conditions, related and support industries performance, and the development strategies. When shown graphically, these four interrelated groups of key factors form a diamond-like shape, hence the term "diamond system."

Porter's national diamond theory mainly analyzes the object of "industry", especially the manufacturing industry. Although higher education has special implications, such as its sociality and non-profit nature, its industrial nature is not obvious. However, with the advancement of globalization and the fact that WTO's General Agreement on Trade in Services (GATS) now formally includes education in the category of "trade in services", and provides for four forms of trade in education services, it is an indisputable fact that trade in education services is real and rapidly developing. Therefore, the view of the national diamond theory is also applicable to the export industry of higher education participating in the competitive international market. It helps provide a broader perspective for the study of higher education export industry, in the sense that the research carried out should not be limited to the internal factors of colleges and universities; it also needs to pay attention to the interaction between colleges and their external settings, such as external demand, related and supporting institutions and so on.

The main research objective of this paper is the competitiveness of education export by local colleges and universities, and as a result, the various elements defined in Porter's "National Diamond Model" need to be revised to suit the present need. These modified factors are shown in Table 1.

Table 1. Analysis elements in Porter's National Diamond Model

	Analysis element
Production conditions	The geographical location of colleges and universities, investment in infrastructure and information automation, investment in human resources, etc.
Demand conditions	In a certain period of time, the requirements on the number, quality, and structure of educational service providers by all sectors of the national economy and society.
Related and supporting industries	The international competitiveness in service trade of the education and related industries.
Strategy and competitor analysis	The orientation of the development strategy on the internationalization of colleges and universities, and the degree of mutual competition among colleges and universities, etc.
Opportunity analysis	An unplanned, chance happening event that affected the development of education export in a country.
Analysis of government elements	Promoting and standardizing the relevant policies on education export, the investment in the urban infrastructure and the education export support industry, and the financing of educational export in colleges and universities, etc.

Source: Michael Porter (2008). Competitive Strategy: Techniques for analyzing industries and competitors: with a new introduction.

3.1.3 The regression model theory

Regression analysis is an effective way to explore the relationship among independent variables. Multivariate regression assumes a multivariable causal model (such as in "X1, X2, and X3 resulted in Y"), which can not only explain whether multiple variables are dependent is relevant and how much correlation, but also can test the direction of the association. That is, the direction of the causal model itself, and the extent to which multiple independent arguments significantly affect a single variable. With a SPSS multivariate regression, with the continuous introduction of explanatory variables, the explanatory coefficients of some explanatory variables that have entered the regression equation are no longer significant; and the gradual screening strategy in multivariate regression can judge whether there are explanatory variables that can be eliminated, thus improving the accuracy of prediction by the model.

3.2 Main research objectives and methods

3.2.1 The main objective of the current research

The ultimate aim of this study is to help improve the international sustainable competitiveness of China's education exports. The research first comprehensively clarified the history, present situation, and issues of the education export of local colleges and universities in China. The study then analyzed the factors affecting the international sustainable competitiveness of the education export of these institutions, based on Porter's National Diamond model. It then collected relevant data and established the underlying regression model to find the core elements that affect China's international sustainable competitiveness in the educational exports. And finally, it put forward an effective way to enhance China's international sustainable competitiveness in the education service market.

3.2.2 The main methods of research.

This thesis adopts the approach of combining the qualitative description with relevant quantitative analysis and emphasizing both the theoretical and empirical research.

(1) Literature Analysis Method

Consult the research literature on competitive (the national diamond theory), regression analysis theory, and make material preparation for comprehensive analysis such as theoretical analysis and literature review.

(2) Empirical Analysis method

Collect and analyze data through statistical yearbook and related websites, carry out realistic empirical analysis, convert the data into meaningful information, and then draw conclusions.

4. Results and discussion

4.1 Theoretical analysis

4.1.1 History of educational export of local colleges and universities in China

Most of the initial education export originated from international academic exchanges, education abroad, and international education assistance. In the early days after the founding of the country, China was in a period of economic recovery; facing the international situation then and in order to strengthen exchanges and cooperation among socialist countries, China and Poland, Czechoslovakia, Romania, Hungary, Bulgaria started exchanging international students. The 33 students from the 5 afore-mentioned countries who studied in China in 1950 opened the way of export of non-profit education in China. With the development of the relationship between China and neighboring countries, the Soviet Union, Vietnam, and other newly independent countries in Asia, Latin America, and Africa have come to China to study. According to statistics, China has received and trained 7,239 international students from 68 countries (1950-1966). As a result of the outbreak of the Cultural Revolution, the higher education system was completely suspended and subsequently the higher education exports were fully stopped and were not restored until early 1973. So far, China's education export is still guided by the national diplomatic strategy and dominated by the subordinate colleges and universities. There is hardly any trade in educational service. However, this early experience served well for China's local colleges and universities in the preparation for the development of education export.

Since the reform and opening, and with the substantial improvement of China's education level, international cultural and educational exchanges have been strengthened. According to statistics, from 1973 through 1989, China accepted a total of 15,978 scholarship students and more than 20,000 self-sponsored students from 129 countries. In a sense, this is the beginning of China's modern-day education export.

Entering the 1990s, with the Soviet influence and the world's multi-polarity political situations, China's international status is rising rapidly, providing a good external environment for education exports. At the same time, the national policy of relegating the right to recruit international students to local authorities has pushed the local colleges and universities to become the main body of higher education exports. China's education export business has seen a breakthrough. During the period 1990-1999, the total number of higher education exports in China were 6.1 times that from 1950-1989.

Local colleges and universities began to occupy a prominent place in higher education exports.

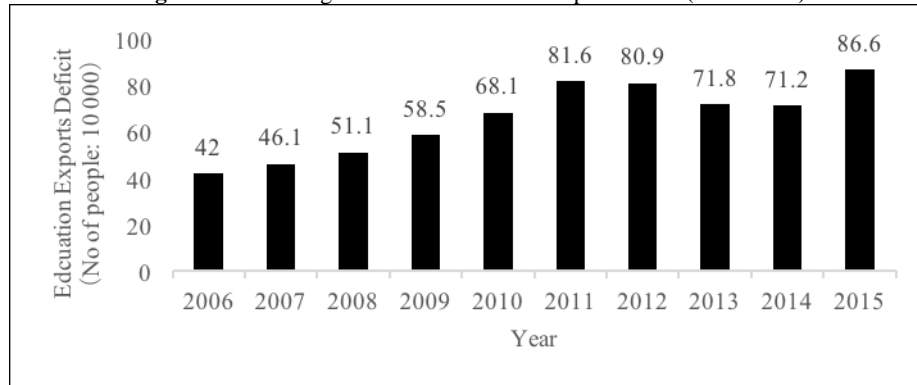
Since entering the new century, education export has gradually evolved into a new type of international service trade industry, and the competition in international education market is becoming ever fierce. And the form of export is no longer confined to the original international student recruitment; it has expanded to include activities involved in running institutions overseas, and to provide cross-border distance learning.

4.1.2 Current situation of education export in local colleges and universities in China

The import and export imbalance of higher education

As China's higher education exports started late and there were many obstacles, China's education exports are still much lower than education imports, and the deficit remains grim (see Figure 1.) In addition, the deficits figures indicated a widening trend.

Figure 1. The change of China's education export deficit (2006-2015)

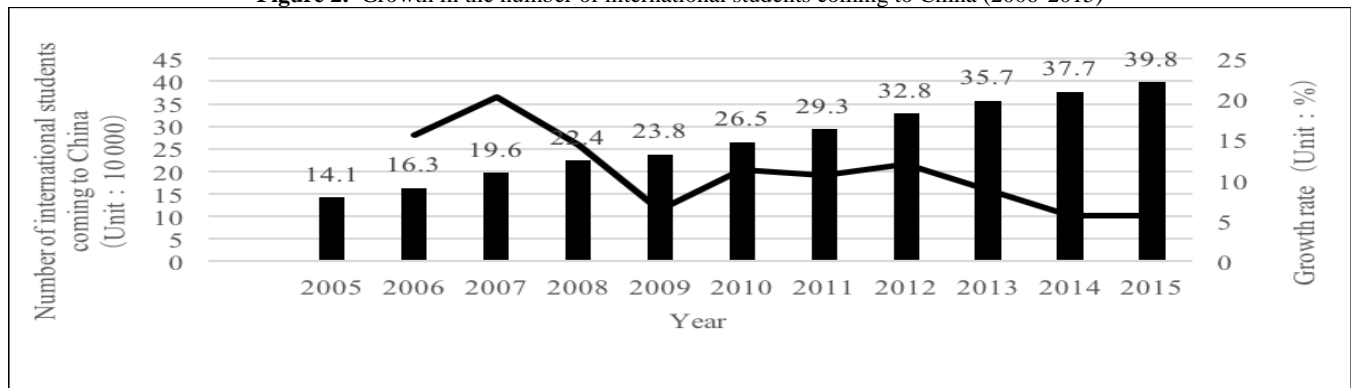


Source: Base on the statistics on inbound international students and overseas Chinese students from 2006-2015 by the Chinese Ministry of Education

4.1.2.2 The slowdown of the growth of education exports

Since 1990, China has seen rapid development of inbound international students. This is especially true since the introduction of the "Road and Belt Initiative" when the central government and the society in general have place increased attention on foreign students coming to study in China. And the number of students coming here to enroll in local colleges and universities showed a good growth trend. However, this growth rate has slowed since 2010, and even began to fall below the 10% level, beginning in 2013 (see Figure 2), according to statistics from the Ministry of Education.

Figure 2. Growth in the number of international students coming to China (2006-2015)



Source: Base on the statistics on inbound international students and overseas Chinese students from 2006-2015 by the Chinese Ministry of Education

The level of education export is lower than that of other countries, and local colleges and universities ranked lower than subordinated colleges

According to statistics, by the end of 2016, the average number of foreign students in each local university was 358.07, representing 2.06% of the total enrollment. This average is well below the traditional hotspot countries such as the United States and Britain, and the emerging destinations such as New Zealand and Australia. In addition, the number and percentage of international students enrolled in local colleges and universities are significantly lower than that of the subordinate colleges and universities (see Table 2).

Table 2. Scale of various types of international students coming to China

		Average	Std Deviation
Number of international students coming to China	Subordinate colleges & universities	1471.11	1495.795
	Local colleges & universities	177.04	409.358
International students as a proportion of the total number of students	Subordinate colleges & universities	6.58%	17.902
	Local colleges & universities	1.32%	7.407

*Source:*Based on a series of survey studies of the international development of higher education in China (www.survey.ceae.edu.cn)

In addition, to further distinguish between different types of colleges and universities (subordinate universities or local colleges and universities), in 2016, the average level of international students in China with academic accreditation was 699.16 for subordinate colleges and universities, and that number for local colleges and universities was only 85.79; the average number of non-academic students in subordinate colleges and universities was 771.95, whereas for local colleges and universities, the number was 91.24. In other words, local colleges and universities lagged far behind the subordinate colleges and universities in the training of both the academic accreditation and non-academic students.

The level of education still needs to be further improved

At present, the educational level of students coming to China can be divided into academic accreditation and non-academic education: Academic accreditation includes the undergraduate and postgraduate education, while non-academic education is mainly for short-term training. Since 1990, both academic accreditation and non-academic education have shown a steady growth trend. However, as of 2016, when compared with other developed countries, the proportion of international academic accreditation students in China is still low (47.63%). The number was relatively higher for non-academic students, especially in the short-term language learning. In addition, the proportion of students coming to China with higher education level also indicated a big gap when compared with Europe and the United States. According to the OECD's "Education at a Glance", in 2015, for Switzerland, Britain, the US, Australia, Sweden and other countries, the "proportion of international students studying for the doctoral degree" was 54%, 43%, 38%, 34% and 34%, respectively; while the proportion of international students studying for master's and doctoral degrees in China was only 7.37%. This shows that although the academic structure for international student education in China is gradually optimized, there is still a big gap when compared with other developed countries. This requires that local colleges and universities to further enhance the internationalization level of disciplines and specialties and adjust the level and structure of academic qualifications.

4.2 Empirical tests based on the regression analysis

4.2.1 Variable selections

In order to quantitatively analyze the factors affecting the export sustainable competitiveness of local colleges and universities in China, we selected the number of educational exports ** of local colleges and universities in China as the dependent variable, and selected certain indexes as independent variables, based on the six factors defined in the Porter's National Diamond model. We performed the statistical analysis and the relationship between the respective independent variables and the dependent variables is presented. The independent variables are as follows:

1. On production conditions: The "average of funds invested per student" (X1), and the "teacher-to-student" ratio (X2) are proposed in the study. Their expected regression coefficients are positive.
2. On the demand conditions: The "enrolment rate of higher education" (X3), and "per capita GDP" (X4) necessary to reflects domestic demand are used here in this category. Both of the expected regression coefficients are positive.

3. On related and supporting industries: The "comprehensive trade sustainable competitiveness index of service trade" (X5), and "urban population rate" (X6) are suggested. The expected regression coefficients for both variables are positive.
4. On strategy and competitors: The "proportion of scholarship students to local Chinese students" (X7), and the "number of institutions that have international student enrollment" (X8) are the two indicators used in the analysis. The expected regression coefficients are positive.
5. On elements of government: The "proportion of higher education in the GDP" (X9) is the indicator for this category. The expected regression coefficient is positive.
6. The aspects of opportunity: The use of a simulation (virtual) variable to represent the chance happening of certain events. For instance, this variable was set to 1 for the occurrence of the following events: when the new standard of fees for self-funded international students was introduced in 1998, China's accession to the WTO in 2001, the outbreak of SARS in 2003, the world financial crisis in 2008, and the H1N1 outbreak in 2009. The value was set to 0 for other years.

4.2.2 The regression analysis

Suppose the multivariate linear regression model is represented as:

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + \beta_6 X_{6i} + \beta_7 X_{7i} + \beta_8 X_{8i} + \beta_9 X_{9i} + \beta_{10} X_{10i} \quad (i=1,2, \dots, 20)$$

The SPSS software was then used to perform a multivariate linear regression analysis (entry method) using the original data collected and the results are presented in Table 3. It is evident that most of the independent variables showed a statistical significance greater than 0.05; thus, it is necessary to consider the possibilities of the Multicollinearity effects and take stepwise regression again to delete the variables unnecessary automatically by using SPSS.

Table 3. Coefficients

Model		Non-standardized coefficient		Standard coefficient	t	Sig.
		B	Standard error	Trial Edition		
1	Constant	-108642.996	111689.750		-.973	.356
	X1	-3.672	2.188	-.181	-1.678	.128
	X2	972.622	1613.267	.016	.603	.561
	X3	2556.441	2010.674	.198	1.271	.235
	X4	4.341	1.570	.534	2.765	.022
	X5	-703.061	491.072	-.043	-1.432	.186
	X6	-1269.377	5137.894	-.076	-.247	.810
	X7	2124.239	3229.160	.035	.658	.527
	X8	290.194	84.030	.382	3.453	.007
	X9	63770.982	66221.972	.114	.963	.361
	X10	-3088.029	3333.603	-.010	-.926	.378

After the progressive adjustments, the results are shown in Tables 4 & 5. (

Table 4. Model Summary

Model	R	R Square	Adjusted R Square	Error in standard estimation
1	.996 ^a	.991	.991	12672.69672
2	.998 ^b	.995	.995	9803.53978
3	.999 ^c	.999	.999	5068.40147

Table 5. Coefficients*

	Model	Non-standardized coefficient		Standard coefficient	t	Sig.
		B	Standard error	Trial Edition		
1	Constant	-223241.268	9432.910		-23.666	.000
	number of institutions that have international student enrollment	756.973	16.720	.996	45.273	.000
2	Constant	-326979.432	29599.778		-11.047	.000
	number of institutions that have international student enrollment	535.853	62.498	.705	8.574	.000
	urban population rate	4951.650	1369.254	.297	3.616	.002
3	Constant	-259456.107	18164.880		-14.283	.000
	number of institutions that have international student enrollment	257.108	51.733	.338	4.970	.000
	urban population rate	5272.456	709.426	.317	7.432	.000
	Per capita GDP	2.869	.416	.353	6.899	.000

*Note: Dependent variable- number of educational exports

From the results of Table 4, it is clear that the fitting of the final model is very superior, with all the coefficients registering a value greater than 0.9. From the outcome in Table 5, it is evident that the significance of the three independent variables of X8: the "number of institutions that have international student enrollment", X6: the "urban population rate", and X4: the "per capita GDP" is less than 0.05, meaning the due variable, the "number of educational exports" is affected significantly by these three independent variables. The expression equation of the final model is:

$$Y_i = 2.869 X_{4i} + 5272.456 X_{6i} + 257.108 X_{8i} - 259456.107 \quad (i=1,2, \dots, 20)$$

5. Conclusions

5.1 Empirical Conclusion

From the results of the empirical test, the factors that have a significant impact on the number of education exports by local colleges and universities in China are the "number of institutions that have international student enrollment", the "urban population rate", and the "per capita GDP". The remaining seven factors (as defined in section 4.2.1) have little or no impact. One possible reason could be that the selected variables are not a good proxy for the relevant factors. Another plausible explanation may be that the statistical complexity hinders the embodiment of the variables. Although some of the variables do not have a significant impact, they were still incorporated in the following analysis, per the definition presented in Table 4.

First, on the production conditions, the two indicators of the "average of funds invested per student" (X1), and the "teacher-to-student" ratio (X2) did have a positive but insignificant correlation to the due variable - the local university education exports.

Second, on the demand conditions, the "per capita GDP" showed a significant impact on the number of education exports. From the regression results, the coefficient is 2.869, indicating that when other variables remain unchanged, for a 1% change of the "per capita GDP", the number of local university education exports will change by 2.869%. The implication is that the education exports of local colleges and universities are directly proportional to the living standards of the people. Although the "enrolment rate of higher education" factor is not statistically significant, the regression results indicated that for each 1% change in this indicator, exports will produce a certain amount of change in the same direction. The implication is that, to some extent, the increase in the enrolment rate of higher education is helpful for the improved the export of education.

Third, on related and supporting industries, the "urban population rate" has a significant and positive impact on the number of local university education exports. That is, the higher the urban population rate, the higher the number of education exports by local colleges and universities. The inherent reason is that urbanization will improve (i) the living standards of residents, (ii) the city's infrastructure and environment, and (iv) the globalization level of the city. These ultimately lead to enhanced export of education services by local colleges and universities. The "comprehensive trade sustainable competitiveness index of service trade" has no significant impact on the due variable and is negatively correlated. This may be due to the fact that the index in the data is too broad in scope; in addition, the current trade in services is still in its infancy and not in a position to provide adequate support for the improvement of education exports.

Fourth, on strategy and competitors, the "number of institutions that have international student enrollment" showed significant impact on the education exports. Judging from the regression results, its coefficient is 257.108, meaning that for every unit of increase in the input variable, there would be a corresponding increase of 257.08 unit in the education exports. This clearly reflects that the market for international students is not saturated at present, and the competition among institutions for international student enrollment is not very fierce. An increase in enrollment institutions has instead increased the number of education exports. The variable of "proportion of scholarship students to local Chinese students" has a positive effect on the due variable, but the effect is not significant.

Fifth, on the elements of government, the "proportion of higher education in the GDP" has a positive impact on the number of education exports, but the impact is not significant. This shows that the investment made in local colleges and universities has brought a better teaching/learning environment for the institutions and provided for an important support needed for the all-purpose development of schools; however, its impact on local higher education exports is not satisfactory, statistically speaking. The reason could be that the original data of this study is not enough, or it may also indicate that the above educational investment generated only limited resources for the international students.

Sixth, on the aspect of opportunity, the impact of the simulation variable is not significant. Based on the trend of the due variable, except in 2003 where there has been a significant decline in the number of education exports, there have been no notable changes due to the introduction of this virtual parameter.

5.2 The means for improving the sustainable competitiveness in education exports

Firstly, to improve the domestic demand structure and upgrade the level of external demand

With the improvement of China's economic level and the expansion of the enrollment process in colleges and universities, the gross enrollment rate is growing rapidly. However, due to the rising threshold in the area of education that was imposed by the marketplace of employment and the imbalance in supply and demand for higher education, the unbalanced structure for domestic demand is formed as a result. Students prefer to attend the "985", "211", or other subordinate colleges and universities, and local colleges and universities are left out in the process. The central government should provide policy support for local colleges and universities, change the general public's perception about these institutions, and improve the employment opportunities for their graduates. These arrangements would attract more students to consider and enroll in the local colleges and universities, and hence gradually transform into a balanced cycle.

In addition to the quality of the desired educational products, international students will also focus on the economic conditions, living environment and employment opportunities of the country; this is especially true for international students coming to China. From the perspective of the historical development process evident in developed countries, most of them offers a comfortable environment for living, studying and working, and has a perfect support system for international students. China should also try to offer the similar as soon as possible.

First of all, it is necessary to improve the basic security system, such as medical care and housing, so that international students can integrate more quickly and comfortably into the local communities. Secondly, to expand the scope of scholarships offered, to expand the channels for scholarship fund raising, and to set up educational trust funds in order to attract outstanding students. In addition, the policy restrictions on internships and employment for international students need to be revised. On the one hand, we can properly reduce the financial burden on these international students, and on the one hand, they can better understand China and easily integrate into local communities. And finally, local colleges and universities should try identifying a correct orientation, to attach more importance to improving the education management system, and to improve the level of education services.

Secondly, to speed up the process of urbanization and perfect the educational service system

In the long run, the improvement of the comprehensive urban level is the foundation of educational development and the only way for a country to achieve sustainable development. In the process of speeding up the urbanization process and getting the positive effects out of urbanization, the government should formulate the corresponding export strategy on trade in education services and accelerate the pace of the export of trade in education services. From the short term, it is more realistic to improve the education service system for international students; this system includes the establishing and perfecting of the mutual recognition of academic qualifications, simplifying the enrollment procedure, shortening the visa process, and promoting the formation of agencies to serve as an intermediary. These activities are of great significance to further expand the education exports by local colleges and universities.

Thirdly, to implement adjustment measures for the strategic structure of education exports

There is a need to improve the administrative management system of the higher education. It is necessary endow local colleges and universities with the autonomy to operate their schools, and to vigorously increase the number of college student's enrollment. The policy also needs to allow more local colleges and universities to participate in the recruitment of international students, and to avoid the political tilting in favor of the subordinate colleges and universities. This levelled playing field would help promote more local colleges and universities to participate in competition.

It is essential to establish and perfect the educational quality and supervision mechanism for international students. From the practical experience gained by the developed countries in trade in higher education services, the more successful systems always have a relatively independent quality assurance and audit support program. In view of this, our country should gradually remove the influence of formalism and bureaucracy and establish a credible third-party education quality assurance program for international students.

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Yingfei YANG is PhD. Candidate in International Business, Sejong University, Seoul, South Korea. Meanwhile, she is the Deputy Director of Foreign Affairs Office of Ningbo University of Finance & Economics, PRC. Research interests: International Education, Service Trade, Sustainability development of international education.

ORCID ID: <https://orcid.org/0000-0001-5989-7447>



Michal FABUS PhD. in International Economics Relations, obtained at University of Economics in Bratislava, Vice-rector for Foreign Affairs, Head of Department of Economics and Finance, School of Economics and Management in Public Administration in Bratislava (VSEMs), Slovakia.

ORCID ID: orcid.org/0000-0002-3792-179X



BAE KI-HYUNG is Doctor of Economics, Graduated from Sejong University in 1992. Worked in Sejong University. His research interests include cultural economics, cultural content industry and applied microeconomics.

ORCID ID: <https://orcid.org/0000-0001-5067-0684>



ZHANG MENGZE is Ph.D Candidate in the Department of Economics and Trade, Sejong University, Seoul, South Korea. His research interests include logistics and industrial economy.

ORCID ID: <https://orcid.org/0000-0003-1370-0391>





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SELF-ASSESSMENT OF THE CORPORATE SOCIAL RESPONSIBILITY IN THE AREA OF POSTAL COMPANY *

Miriam Jankalová¹, Radoslav Jankal²

^{1,2} University of Žilina, Univerzitná 1, 010 26 Žilina, Slovakia

E-mails:¹ miriam.jankalova@fpedas.uniza.sk ; ² radoslav.jankal@fri.uniza.sk

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Abstract. The process of globalization and the pressure to achieve and maintain the competitiveness of the enterprise on domestic and international market have in recent years underlined a sharp increase in the need to evaluate Corporate Social Responsibility (CSR). The aim of the paper is to propose a self-assessment of socially responsible business in the postal environment. The following research methods were used to fulfill the aim of the paper: methods of obtaining and collecting information (compilation, selection), methods of information processing (excerption, analysis, synthesis, comparison, concretization) and methods of evaluation and interpretation of results (abstraction, induction, deduction, determination, generalization). Taking into account the theoretical definitions, the specifics of the postal company and the findings of secondary research, an evaluation sheet (checklist) can be proposed as a basis for self-assessment of CSR in four areas - economic, social, environmental and legal. The main component of the checklist is a self-assessment questionnaire, consisting of 62 questions. The questions are grouped under four items: economic, social, environmental and legal. Summary score of a specific area of CSR is an indicator of categorizing postal company into one of the four developmental stages of applying the principles of CSR

Keywords: self-assessment, corporate social responsibility, check list, postal company

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1. Introduction

The process of globalization and the pressure to achieve and maintain the competitiveness of the enterprise on domestic and international market have in recent years underlined a sharp increase in the need to evaluate CSR.

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The practice is evidence that there are currently approaches that allow to assessing corporate social responsibility. Guidelines can be indices for measuring and reporting CSR (Dow Jones Sustainability Indexes, FTSE4Good Index, Natur Aktien Index, Ethibel Sustainability Index, Global Challenges Index, MSCI World ESG Index), Business Excellence models (EFQM model, Baldrige Excellence Framework), initiatives (Global Reporting Initiative, Global Compact Initiative), standards (AccountAbility's AA1000 Series of Standards, Social Accountability – SA 8000). The problem is not the lack of these approaches, but that not every approach can measure the state in each area of CSR. (Jankal, Jankalová, 2016; Jankalová, Jankal, 2016; Jankalová, Jankal, 2017; Jankalová, Jankal, 2018)

The views on the identification of individual areas of corporate social responsibility differ due the different views on this issue. The best-known division of CSR areas is based on the triple bottom line principle (Jankalová, 2013), which draws attention to the economic, social and environmental areas, respectively to the economic, societal and ecological areas. A number of domestic and foreign authors align with this division (Trnková, 2005; Prskavcová et al., 2008; Uddin, Hassan and Tarique, 2008; Lakin and Scheubel, 2010; Kuldová, 2010; González-Rodríguez, Díaz-Fernández and Simonetti, 2015; Allen and Craig, 2016). However, there are also divisions into other three areas, e.g. social, product and environmental (Anselmsson and Johansson, 2007), ethical, economic and legal (Remišová, Búciová and Fratričová, 2013), environmental, philanthropic and ethical (Newton, 2014), or environmental, social and legal (Chau, Lui, Yim and Kwan, 2016). Four CSR areas were first defined by Carroll (1979): economic, legal, ethical and philanthropic area, C. N. Jucan and M. S. Jucan (2010) as well as Akdoğan, Tanç and Cingöz (2011) agree with this approach. Dahlsrud (2008) identified five CSR areas: environmental, social, economic, stakeholders and voluntariness. Other authors also share his opinion (Smith, 2011; Slack, Brandon-Jones and Johnston, 2013; Rasoulzadeh, Hosseini pour, Yusof, Soltani and Hashemi, 2013). At least CSR areas, only two, identified Garriga and Mele (2004) and also Subudhi, Kar and Ram (2013) according to which CSR is divided into economic and ethical area.

Despite the differing opinions of the authors, the areas of CSR are often categorized into only three principal groups (see Elkington, 1994): economic, social and environmental, which are a manifestation of the triple bottom line principle (People, Planet, Profit). The legal area, as a separate group, is only addressed by some authors (Carroll, 1979; Carroll, 1991; Búciová, 2008; Remišová, 2011). It may also be because the legal area is integrated into other areas, which is why it is not given such attention. V. Marková (Marková, 2011) is of the same opinion: "Although the definitions of several authors emphasize this concept as "voluntary integration of social and environmental interests into everyday business activities...", the consequences of irresponsible business of natural or juridical persons needs to be dealt with by legislation".

Several authors (de Graaf and Toennesen, 2010; Kanji and Chopra, 2010; Neergaard and Pedersen, 2012) and organizations (CSR Kiválóság, 2011; CSR Europe, 2014; EcoVadis, 2019; IFU, 2019; Business.un, 2019) are of the opinion that CSR should be based on self-assessment, following the example of known models based on TQM principles. According to Andy Singer (president of Singer Executive Development, a professional training and development company that helps optimize business performance of employees and executives), a checklist is a good tool because (Singer, 2014):

1. Organization (Checklists can help us stay more organized by assuring we don't skip any steps in a process),
2. Motivation (Checklists motivate us to take action and complete tasks. Since checklists can make us more successful, it becomes a virtuous circle where we are motivated to accomplish more due to the positive results.),
3. Productivity (By having a checklist you can complete repetitive tasks more quickly and efficiently, and with fewer mistakes. You become more productive and accomplish more each day.),
4. Creativity (Checklists allow you to master the repetitive tasks and utilize more brain power for creative activities),

5. Delegation (By breaking down tasks into specific tasks, checklists give us more confidence when delegating activities. When we are more comfortable that tasks will be done correctly, we delegate more and become significantly more productive.),
6. Saving lives (Checklists are only as useful as our ability to action each step),
7. Excellence (Excellence is a differentiator that improves brand equity. Checklists allow us to be more effective at taking care of customers. Using checklists ensures that you won't forget anything. So, if you do something again and again, and want to do it right every time, use a checklist.).

The aim of the paper is to propose a self-assessment of socially responsible business in the postal environment. In order to fulfill the aim of this paper, it is necessary to apply the triple bottom line principle focusing on economic, social and environmental areas, which is also shared by many domestic and foreign authors (Trnková, 2005; Prskavcová et al., 2008; Uddin, Hassan and Tarique, 2008; Lakin and Scheubel, 2010; Kuldová, 2010; González-Rodríguez, Díaz-Fernández and Simonetti, 2015; Allen and Craig, 2016). Because the postal company provides postal services only on the basis of registration by the Regulatory Authority for Electronic Communications and Postal Services in accordance with the General Authorization and the Postal Services Act, it is necessary to traditional triple bottom line principle extended to a fourth area, namely legal. The reason for this choice is the fact that postal company differ from others in terms of legislative specifics that need to be taken into account in the process of CSR self-assessment.

2. Methodology

The aim of the paper is to propose a self-assessment of socially responsible business in the postal environment. The main objective was preceded by:

- the identification of individual areas of corporate social responsibility necessary for the process of CSR self-assessment in the postal environment (Item 1),
- the identification of a tool for self-assessment of CSR in postal environment (Item 2),
- the identification of CSR activities suitable for proposing self-assessment of CSR by postal company (Item 3).

The results of these findings are stated in the following part 3.

The primary sources were mainly domestic and foreign scientific publications on socially responsible entrepreneurship, sustainable development and business ethics; research databases and the author's own experience gained through long-term cooperation with postal companies. The following research methods were used: methods of obtaining and collecting information (compilation, selection), methods of information processing (excerption, analysis, synthesis, comparison, concretization) and methods of evaluation and interpretation of results (abstraction, induction, deduction, determination, generalization).

3. Results

3.1. Backgrounds

Item 1: the identification of individual areas of corporate social responsibility necessary for the process of CSR self-assessment in the postal environment

The analysis of the issue confirmed that there are approaches that allow to assessing corporate social responsibility (indices for measuring and reporting CSR, Business Excellence models, initiatives, standards), but that not every approach can measure the state in each area of CSR.

Opinions on the division of CSR areas are different (based on contributions from authors and published in reputable scientific databases). Some authors define only two areas, others three, four or five areas (Table 1).

Table 1. CSR areas by selected authors

Selected authors	CSR Areas
Trnková (2005); Prskavcová et al (2008); Uddin, Hassan & Tarique (2008); Lakin & Scheubel (2010); Kuldová (2010); González-Rodríguez, Díaz-Fernández & Simonetti (2015); Allen & Craig (2016)	economic, social/societal and environmental/ecological
Anselmsson & Johansson (2007)	social, product and environmental
Remišová, Búciová & Fratričová (2013)	ethical, economic and legal
Newton (2014)	environmental, philanthropic and ethical
Chau, Lui, Yim & Kwan (2016)	environmental, social and legal
Caroll (1979); C. N. Jucan & M. S. Jucan (2010); Akdoğan, Tanç & Cingöz (2011)	economic, legal, ethical and philanthropic
Dahlsrud (2008); Smith (2011); Slack, Brandon-Jones & Johnston (2013); Rasoulzadeh, Hosseinipour, Yusof, Soltani & Hashemi (2013)	environmental, social, economic, stakeholders and voluntariness
Garriga & Mele (2004); Subudhi, Kar & Ram (2013)	economic and ethical

Source: In table listed authors

As results from Table 1, the most common CSR areas are those stemming from the triple bottom line principle (economic, social/societal, environmental/ecological). In addition to these “traditional” areas of CSR, some authors have identified ethical and legal area as a separate CSR area, thus highlighting in particular the importance of ethical and legal principles in assessing CSR.

Finding: *To fulfill the aim of this paper, we decide to apply the triple bottom line principle focusing on economic, social and environmental areas. The following domestic and foreign authors (Trnková, 2005; Prskavcová et al., 2008; Uddin, Hassan and Tarique, 2008; Lakin and Scheubel, 2010; Kuldová, 2010; González-Rodríguez, Díaz-Fernández and Simonetti, 2015; Allen and Craig, 2016) have the same opinion. Because the postal company provides postal services only on the basis of registration by the Regulatory Authority, it is necessary to extend the triple bottom line principle to a fourth area - legal. The reason is the fact that postal company differ from others in terms of legislative specifics that need to be taken into account in the process of CSR self-assessment.*

Item 2: the identification of a tool for self-assessment of CSR in postal environment

Several authors (based on contributions from authors and published in reputable scientific databases) are of the opinion that CSR should be based on self-assessment, similar to models based on TQM principles. We agree with the opinion of these authors and with the opinion of Andy Singer, who considers the checklist to be a suitable tool for self-assessment, for the reasons given in the “Introduction” section.

Taking into account the theoretical definitions, the specifics of the postal company and the findings of secondary research, an evaluation sheet can be proposed as a basis for self-assessment of CSR in four areas - economic, social, environmental and legal (Table 2).

Table 2. The proposed evaluation sheet for the specific area of CSR

Evaluation criterion	Yes	Yes, but only partially	No, but we don't resist change	No

Source: Authors

Finding: As a basis of self-assessment can be used evaluation form (IFU, 2019) that helps to determine to what extent a company meets the most fundamental rights and requirements regarding significant sustainability issues. It can be used to identify any areas requiring further attention and to prioritise sustainability activities and can also be a part of a learning process for both managers and employees.

Item 3: the identification of CSR activities suitable for proposing self-assessment of CSR by postal company
The main component of the checklist is a self-assessment questionnaire, consisting of 62 questions. The questions are grouped under four items: economic, social, environmental and legal.

The economic area is focused on corporate governance, its transparency and building good relations stakeholders. Each indicator is formulated in a form of a question. An overview of the evaluation criteria within the economic area of CSR (18) is given as follows (Table 3):

Table 3. An overview of the evaluation criteria within the economic area of CSR

Evaluation criterion	Yes	Yes, but only partially	No, but we don't resist change	No
Do you have a code (codes) of ethics or similar directives in your company governing the conduct of employees towards all stakeholders?				
Do you manage the business to ensure the company's ability to create the wealth and well-being of the community in which you operate?				
Do you have business activities aligned with the expectations of company stakeholders?				
Are you active in the field of intellectual property protection?				
Do you stimulate innovative thinking?				
Do you provide business information to all stakeholders so that they can gain insight into matters that are directly relevant to them?				
Are the informations you provide to stakeholders reliable and transparent?				
Are you actively fighting against corruption?				
Are you trying to increase customer satisfaction by eliminating the number of complaints and claims?				
Do you emphasize the quality of services provided?				
Do you emphasize the security of the services provided?				
Do you emphasize the availability of services to all customers equally?				
Do you apply the principles of fair advertising by providing truthful information about the services you provide?				
Do you apply equal opportunities in the selection of suppliers?				
Do you try to respect the agreed conditions relating to the supply of services?				
Do you respect the due date of invoices for goods and services received?				
Do you respect the rules of fair competition?				
Do you monitor the route of the transport of mail by GPS signal in order not to decrease the quality level of provided services?				

Source: Authors

The social area is divided into two parts, internal (presented by employees) and external (presented by philanthropy and local community). Each indicator is formulated in a form of a question. An overview of the evaluation criteria within the social area of CSR (18) is given as follows (Table 4):

Table 4. An overview of the evaluation criteria within the social area of CSR

Evaluation criterion	Yes	Yes, but only partially	No, but we don't resist change	No
Do you create conditions for employees to reconcile their work and personal lives? (flexible working hours, company kindergarten ...)?				
Do you create conditions for employees to further improve their qualifications?				
Do you support permanent training/education of employees?				
Do employees have the possibility of career advancement?				
Do you provide retraining of redundant employees?				
Do you acknowledge employees wages commensurate with their performance?				
Do you provide your employees with social or other benefits beyond the scope of the legislation (pension contribution, holiday allowance, anniversaries ...)?				
Do you treat with the same respect to every employee, regardless of their gender, age, ethnic origin, sexual orientation, nationality, disability or religion?				
Do you take care to protect the health and safety of employees at work?				
Do you provide your employees with regular medical check-ups?				
Do employees have the opportunity, without any fear to express their opinion?				
Do you consider the impact of business on respect for human rights?				
Do you ensure that complaints about violations of Corporate Responsibility policy are investigated?				
Are you involved in supporting and managing corporate philanthropy?				
Regarding infrastructure, do you ensure that operators, after working hours, park company cars solely on land owned by the company or on places designated for that purpose?				
Do you monitor the activities of operators (driving speed via GPS signal to prevent traffic violations)?				
Do you participate in improving the process of teaching students through cooperation with educational institutions (excursions, offering student work, providing cooperation in the creation of final work of students ...)?				
Is offering of free working positions available also for disadvantaged groups of job seekers (school leavers, mothers with children, older people)?				

Source: Authors

The environmental area is focused primarily on the efforts of companies to reduce the consumption of energy and material resources, including CO₂ emissions. Each indicator is formulated in a form of a question. An overview of the evaluation criteria within the environmental area of CSR (16) is given as follows (Table 5):

Table 5. An overview of the evaluation criteria within the environmental area of CSR

Evaluation criterion	Yes	Yes, but only partially	No, but we don't resist change	No
Do you have an environmental policy for the company?				
Is environmental management in line with national and international standards (ISO 14 001, EMAS ...)?				
Do you monitor the environmental impact of your business?				
Do you evaluate the monitoring of the environmental impact of the company?				
Do you invest in environmental technologies and in other measures that limit the negative environmental impact of your business?				
Do you implement energy saving measures?				
Do you use renewable energy sources?				
Do you separate?				
Do you use recycled material when packing packages?				
Do you promote environmental protection at the place where you operate?				
Do you follow the safety guidelines when handling hazardous substances?				
Do you have measures in order to reduce CO2 emissions?				
Do you prefer a more environmentally friendly form of shipment?				
Do you use electric vehicles or other environmentally friendly vehicle for short-distance transport?				
Do you create conditions for minimizing traffic load by eliminating transport duplication in the logistics infrastructure that prevent conflicts of several operators on the same route?				
Do you create conditions for minimizing traffic load by eliminating the occurrence of empty transport vehicles in the logistics infrastructure in the best possible way of allocating the collection and delivery of postal items?				

Source: Authors

The legal area takes into account the requirements imposed on postal companies within the meaning of Act No. 324/2011 Coll. on Postal Services. Each indicator is formulated in a form of a question. An overview of the evaluation criteria within the legal area of CSR (10) is given as follows (Table 6):

Table 6. An overview of the evaluation criteria within the legal area of CSR

Evaluation criterion	Yes	Yes, but only partially	No, but we don't resist change	No
Do you inform the sender before concluding the contract in advance about which items or things are excluded from collection and distribution (narcotic and psychotropic substances, defamatory shipment modification, items whose circulation is prohibited ...)?				
Do you ensure timely and comprehensible information on the content and conditions of postal services for all disabled and handicapped customers at all postal network access points?				
Do you ensure that informations on the content and conditions of postal services are published in full and in another appropriate way that guarantees access to them also for all disabled and handicapped customers?				
Do you care to deliver postal items and remittance payments with the best professional care?				
Do you check the timeliness of delivery of postal items, which must be delivered within a time period appropriate to the type of postal item and the method of				

delivery?				
Do you have implemented measures by collection, distribution and delivery that protect postal items and remittance payments sufficiently from loss, theft and damage?				
Do you inform your customers of the possibility to designate an authorized person to take delivery of the shipment if the addressee cannot take delivery of him personally?				
Do you inform the customer about how to claim the service if it is dissatisfied with the service?				
Do you inform your customers about the possibility of free and quick elimination of shortcomings in the postal service or postal payment system?				
Do you have measures in place to ensure the protection of information on postal services and postal payments, including the protection of personal data from unauthorized access or disclosure and from misuse?				

Source: Authors

3.2. Evaluation of responses from the evaluation sheet

The assessor, who may be a competent manager, business owner or employee responsible for CSR, carries out the assessment according to the level of the selected criteria (Table 7, Table 8).

Table 7. The proposed evaluation of the responses according to the level of the selected criteria

Answer	Score
Yes	3,00
Yes, but only partially	2,00
No, but we don't resist change	1,00
No	0,00

Source: Authors

Table 8. The lowest and highest score for each area of corporate social responsibility

Area of CSR	Lowest - Highest score
Economic	0,00-54,00
Social	0,00-54,00
Environmental	0,00-48,00
Legal	0,00-30,00

Source: Authors

The individual value of each criterion, or the sum of the criteria in a particular CSR area, will provide the assessor with information on the postal companies' access to specific CSR activities (Table 9, Table 10, Table 11, Table 12). The result can be:

1. proactive approach - the company carries out activities in individual areas of CSR and initiates continuous improvement within them,
2. positive approach - the company does not perform multiple CSR activities, but looks for ways to change it,
3. neutral approach - the company does not resist any changes, but the CSR activities are carried out non-initiative,
4. negative approach – the company expressed its antipathetic attitude towards the implementation of CSR activities and any changes in the company.

Table 9. Postal company approach to the realization of activities in the economic area

Score	Approach
54,00-45,00	Proactive approach
44,00-27,00	Positive approach
26,00-9,00	Neutral approach
8,00-0,00	Negative approach

Source: Authors

Table 10. Postal company approach to the realization of activities in the social area

Score	Approach
54,00-45,00	Proactive approach
44,00-27,00	Positive approach
26,00-9,00	Neutral approach
8,00-0,00	Negative approach

Source: Authors

Table 11. Postal company approach to the realization of activities in the environmental area

Score	Approach
48,00-40,00	Proactive approach
39,00-24,00	Positive approach
23,00-8,00	Neutral approach
7,00-0,00	Negative approach

Source: Authors

Table 12. Postal company approach to the realization of activities in the legal area

Score	Approach
30,00-25,00	Proactive approach
24,00-15,00	Positive approach
14,00-5,00	Neutral approach
4,00-0,00	Negative approach

Source: Authors

Intervals were determined based on a combination of scoring (3, 2, 1 or 0 points) and the number of criteria in each assessment area, as follows:

1. Proactive approach:

$$\text{the upper limit of assessment} = n \cdot h_1 \quad (1)$$

where n = number of criteria; h_1 = evaluation score of answer yes

$$\text{the lower limit of assessment} = n \cdot ((h_1 + h_2) / 2) \quad (2)$$

where n = number of criteria; h_1 = evaluation score of answer yes; h_2 = evaluation score of answer yes, but only partially

2. Positive approach:

$$\text{the upper limit of assessment} = n * ((h_1 + h_2) / 2) - 1 \quad (3)$$

where n = number of criteria; h_1 = evaluation score of answer yes; h_2 = evaluation score of answer yes, but only partially

$$\text{the lower limit of assessment} = n * ((h_2 + h_3) / 2) \quad (4)$$

where n = number of criteria; h_2 = evaluation score of answer yes, but only partially; h_3 = evaluation score of answer no, but we don't resist change

3. Neutral approach:

$$\text{the upper limit of assessment} = n * ((h_2 + h_3) / 2) - 1 \quad (5)$$

where n = number of criteria; h_2 = evaluation score of answer yes, but only partially; h_3 = evaluation score of answer no, but we don't resist change

$$\text{the lower limit of assessment} = n * ((h_3 + h_4) / 2) \quad (6)$$

where n = number of criteria; h_3 = evaluation score of answer no, but we don't resist change; h_4 = evaluation score of answer no

4. Negative approach:

$$\text{the upper limit of assessment} = n * ((h_3 + h_4) / 2) - 1 \quad (7)$$

where n = number of criteria; h_3 = evaluation score of answer no, but we don't resist change; h_4 = evaluation score of answer no

$$\text{the lower limit of assessment} = n * h_4 \quad (8)$$

where n = number of criteria; h_4 = evaluation score of answer no.

Summary score of a specific area of CSR is an indicator of categorizing postal company into one of the following developmental stages of applying the principles of CSR, eg. in this way too (Table 13):

Stage 1 - the developmental stage where the company did not understand the need to apply CSR principles in the area of business management and in building relationships with stakeholders,

Stage 2 - the developmental stage where the company has understood the need to apply CSR principles in the area of business management and in building relationships with stakeholders, but the CSR activities are not yet initiated,

Stage 3 - the developmental stage, when the company acts as socially responsible, does not carry out several CSR activities, but seeks ways to change it,

Stage 4 – the development stage, when a company considers CSR as part of its business strategy, constantly improves its activities in individual areas of CSR and implements the principles of CSR in all company activities.

Table 13. Categorization of the postal company to the appropriate development stage

Score	Development stage
0,00-30,00	Stage 1
31,00-92,00	Stage 2
93,00-154,00	Stage 3
155,00-186,00	Stage 4

Source: Authors

Conclusions

Corporate social responsibility is a responsibility of company towards the environment and oneself. De facto, it offers a set of principles and values on the basis of which it is possible to make the transition to a sustainable system. For this reason, too, it is important that businesses associate CSR not only with corporate philanthropy (with donations to foundations and support for nonprofit projects), but with the integration of the principal areas of corporate social responsibility into the corporate strategy. The following recommendations may also be guide how to finalize these conditions:

- management's conviction of the need to apply CSR principles in corporate governance and stakeholder building,
- identification of the person responsible for the area of corporate social responsibility in company,
- identification of stakeholders and their interests,
- identification of corporate values in relation to stakeholders,
- identifying priority areas and objectives for each CSR area in order to develop an action plan,
- implementation of action plan,
- assessment of CSR activities,
- informing stakeholders of the assessment of CSR activities,
- taking actions to improve CSR of the company.

In view of the categorization of the postal company to the relevant development stage (Table 13), it is possible to identify recommendations for each category separately:

Stage 1: The postal company should at this stage set out and describe corporate values and align them with the values of corporate social responsibility. Consequently, it is appropriate to select and entrust a responsible person in the field of Corporate Social Responsibility in the company, who will involve employees within the company in developing a CSR strategy. An important place in the implementation of CSR in the company is the identification of stakeholders and their interests, which helps the company to set up its CSR strategy. Once these activities have been carried out, the company will move to the next stage of the CSR principles application.

Stage 2: At this stage, the postal ucompany should develop a strategic plan based on an analysis of the stakeholders of the company and on the company values. In the strategic plan, it is important to identify the key areas of CSR that the company wants to pursue most in applying CSR principles and to define the main goals of CSR and the concrete actions to achieve these goals. It is essential to involve postal employees in carrying out the planned CSR activities.

Stage 3: At this stage, the company has already developed a strategic plan, engaging employees in CSR activities, is open to changes that can improve CSR activities, but it is important to select appropriate indicators to monitor and measure progress access in various areas of corporate social responsibility, which is a suitable help increase corporate responsibility. To improve the effectiveness of postal companies' CSR policy contribute informing stakeholders about the activities performed and evaluated, either through the company's website, the company's annual reports, or through a separate CSR report.

Stage 4: At this stage, the postal company considers CSR to be part of its business strategy, attaches considerable importance to it, continuously improves its activities and integrates CSR into all of its activities. It can only be added that he should persevere in such an activity and not forget to regularly inform interested parties about his activities. It is also appropriate at this stage not to ignore the critics of such activity, but to involve them in problem solving or communication and strive to continually improve the company in each area.

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Miriam JANKALOVÁ (Assoc. Prof., Ing., PhD., DipIFR) is an associate professor at the Faculty of Operation and Economics of Transport and Communications. She is a lecturer, author, researcher and consultant, specializing in the areas of Business Excellence, Quality Management and Accounting. She is university teacher at the University of Žilina and her research is interested in Quality Management and Business Excellence. Her publication activities involve articles, textbooks and monographs on such area. She is member of many scientific boards and professional committees. She works also as a certified court translator (German – Slovak).

ORCID ID: orcid.org/0000-0001-7260-5787; **RESEARCHER ID:** P-1191-2016



Radoslav JANKAL (Assoc. Prof., Ing., PhD.) is an associate professor at the Faculty of Management Science and Informatics. He is a lecturer, author, researcher and consultant, specializing in the areas of Strategic Management, Quality Management and Business Ethic. He is university teacher at the University of Žilina and his research is interested in Quality Management and Business Ethic. His publication activities involve articles, textbooks and monographs on such area. He is member of many scientific boards.

ORCID ID: orcid.org/0000-0001-6447-1651; **RESEARCHER ID:** P-1044-2016



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RESPONSIBLE ENTREPRENEURSHIP: IS THERE SCOPE FOR ITS ADOPTION BY IMMIGRANT-OWNED BUSINESSES IN SOUTH AFRICAN TOWNSHIPS?

Silas Mukwarami ¹, Robertson K. Tengeh ², Josephat Mukwarami ³

¹²³*Faculty of Business and Management Sciences, Cape Peninsula University of Technology, South Africa*

E-mails: ¹msilomuk@gmail.com; ²tengehr@cput.ac.za; ³jolief2006@yahoo.com

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Abstract. Concerns about their business practices have precipitated the recent wave of attacks on immigrants in South African Townships. Besides claims that they take away jobs, business opportunities, the locals accuse the immigrants of unfair and irresponsible business practices. All this speaks powerfully to the issue of social legitimacy. Against this backdrop, this paper gauged the business practices of immigrant-owned spaza shops in the hope that the adoption of responsible business practices could act as an intervention strategy for easing the tension between natives and foreign immigrants. The paper followed a quantitative research approach that made use of questionnaires to solicit data from subjects that were purposively selected. The study suggests that immigrant entrepreneurs are treating CSR programmes selectively as issues like training and education, donating to the local communities and employment of natives failed to gain a significant acknowledgement. This, further proves that the CSR ideology has been partially received by the immigrant entrepreneur in the local Townships and thus making it challenging to manage multi-dimensional stakeholder relationships, as issues around credence remain pending. Leaning on the stakeholders and legitimacy theories, this paper advances the case for adoption of CSR by informal businesses and particularly as a possible antidote to the xenophobia that is driven by unfair competitive advantage and unfair business practices by South African township entrepreneurs.

Keywords: township economy; immigrant entrepreneurship; corporate social responsibility; stakeholders; immigrants; xenophobia; spaza shops

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1. Introduction and background

The narrative of migration in Africa remains a trending theme in the sustainable development discourses and particularly regarding poverty eradication. In Africa, most of the immigrants leave their countries, mainly due to economic, social and political problems in the hope of a better life in the host country. Amongst the countries that have become a destination for refugees, South Africa remains the most preferred by refugees from Africa and Asia. Perhaps this can be attributed to its liberal approach to the settlement of refugees (Tengeh, 2019). In fact,

South Africa has adopted a coherent open-for-business approach that encourages people from all walks of life to start small businesses (Tengeh, Ballard & Slabbert, 2011; Asoba & Tengeh, 2016). The approach opened economic opportunities for foreign nationals who have been pushed by political and economic challenges in their mother countries to start businesses. Today, immigrants seem to dominate most of the traditional trading outlets such as street vending (Lapah & Tengeh, 2013), malls, grocery shops (Mukwarami & Tengeh, 2017; Charman, Petersen & Piper, 2012), craft shops (Asoba & Tengeh, 2016) in both urban and townships. The positive approach to immigrant-settlement has come under attack in recent years from locals in the Townships as exhibited by xenophobia and targeted crime (Mukwarami, Mukwarami & Tengeh, 2018).

While there have been some positive spinoffs associated with the entrance of immigrants into markets that were traditionally enjoyed by locals, it has become clear that their dominance of the market has not been taken lightly (Mukwarami & Tengeh, 2017; Mukwarami et al., 2018). Perhaps this may be attributed to the fact that the foreign-owned business operations have gradually pushed out those of locals and the sustainability of native-owned business operations has become a cause for concern (Mukwarami & Tengeh, 2017).

While the literature attributes the growth of immigrant-owned businesses to strategic purchasing, clan-based business network, convenient operating times and sound financial management practices (Liedeman et al., 2013; Mukwarami et al., 2018), the locals associate it to an unfair advantage resulting from dishonest business practices. It is perceptions such as these that continue to fuel attacks on the businesses owned by African immigrants in the last couple of years (Vromans, Schweitzer, Knoetze & Kagee, 2011; Tengeh, 2016; Ndinda & Ndhlovu, 2016). Regardless of the negative narratives, spaza shops owned by foreigners, contribute to addressing social-economic problems such as poverty and unemployment (Mutetyetoka & Madzivhandila, 2014; Edwards & Jenkins, 2015).

Even though the issues around the challenges that immigrant-owned businesses face have received reasonable consideration from scholars in South Africa (see Kalitanyi & Visser, 2010; Tengeh et al 2011; Lapah & Tengeh, 2013; Fatoki & Patswawairi, 2012; Khosa & Kalitanyi, 2014; Mkwanzazi & Mbohwa, 2016; Asoba & Tengeh, 2016; Mukwarami & Tengeh, 2017; Mukwarami et al., 2018), the future of foreign operations in South Africa remains in the balance with the emergence of new challenges as xenophobia.

Fuelling xenophobia today is the perceived irresponsible business practice of immigrant-owned businesses, and one would look in the direction of CSR for a possible solution. There is ample literature that suggests that CSR is an essential tool for managing stakeholder relationships and the associated risks that seem to characterise the problem articulated in this paper (Mukwarami, Nyirenda & Fakoya, 2017; Isanzu & Fengju, 2016). Despite this empirical support, CSR is grossly perceived to be practised by and suitable for big businesses (Chazireni, 2017).

The involvement of small business in CSR is slowly gaining the attention of scholars in South Africa (Hlatywayo, 2015; Masarira, 2014; Turyakira, Venter, Smith, 2012). Apart from Fatoki (2018), CSR studies with a specific focus on South Africa are still limited, and this is particularly relevant in the cases of small businesses owned by immigrants operating in the South African Townships. This paper hopes to stretch the literature on CSR with particular emphasis on immigrant-own firms in the hope that the adoption of responsible business practices could circumvent the tension between natives and foreign immigrants.

2. Literature review

2.1 Immigrant entrepreneurs in South Africa

The engagement of foreign nationals in entrepreneurial activities that include the startup and operation of enterprises in their host country is referred to as immigrant entrepreneurship (Tengeh *et al.*, 2011; Khosa & Kalitanyi, 2014). South Africa has seen an influx of foreign nationals who are either political or economic refugees since its return to democracy in 1994. That has since seen immigrants from all over the world converging in South Africa with African immigrants showing a particular interest in South Africa as their country of destination.

The presence of immigrants in the South African informal economy has been significantly manifested through the emergence of various business activities such as cell phone repairs, mechanics, craft, shoe repair and trading which include Spaza shops. Immigrants tend to dominate the spaza sub-sector, and this has to some extent resulted in some form of competition between natives and immigrant entrepreneurs (Ligthelm, 2011). Hence, resulting in the emergence of multidimensional challenges within the informal sectors.

2.2 Overview of Spaza shops

The spaza shop is a popular grocery entity that provides the community with essential grocery items, and they are typical of South African townships. Some scholars have acknowledged the vital role that spaza shops play in creating employment, reduction of poverty and as a source of household income (Mukwarami *et al.*, 2018; Basardien *et al.*, 2014; Tengeh *et al.*, 2012; Ligthelm, 2011).

Spaza shops are part of the informal sector and benefit from the fewer formalities that are involved in their formation and operation. Partly attracted by the ease of entry and pushed by unemployment in the formal sector, foreign nationals have since moved into this segment of the informal market that was traditionally reserved for Natives (Tengeh *et al.*, 2012). The sheer number of the immigrant-owned spaza shops and the strategies that they implore have attracted attention to their activities in these townships (Mukwarami *et al.*, 2017). Liedeman, *et al.*, (2013) assert that close to 70% of indigenous spaza shops have closed down their operations in the Delft, township as the result of competition from their foreign counterparts. The resultant imbalance in the ownership demographics of spaza shops has triggered hostile confrontations which target foreign immigrants. This raises the narrative of the social contract as the community members who are supposed to protect the businesses find themselves on the forefront during the attacks on spaza shops. One may, therefore, argue that legitimacy issues in the context of spaza shop businesses should receive a top priority in the discourses relating to the survival of small businesses.

2.3 Organisational legitimacy in the context of foreign-owned Spaza shop operations

Businesses do not exist in isolation from the communities in which they operate. Hence it is given that the long-term success of the business would be influenced by the level of approval of most of those who are affected by its activities (Tengeh & Mukwarami, 2017). Going by this, it is critically important that businesses eliminate all threats to organisational legitimacy by ensuring that congruence between business value, norms and behaviour matches that of the host environment (Dowling & Pfeffer, 1975).

Regardless of the size, a business tackles social, economic, and environmental challenges, and it is customary that they gain the social license to operate (SLO) depending on how well it meets the need of the community in which they serve. SLO arises from having a good reputation in the community and solving societal issues. As such, it is widely accepted that organisational legitimacy can be potentially gained through CSR strategies (Hlatywayo,

2015; Randrianasolo, 2018) which coherently provides a linkage between stakeholder management, corporate governance and sustainable development (Thulo, 2015). The current state of the spaza shops business environment suggests that there are issues of legitimacy that have undermined the contribution of foreign businesses in certain sections of host communities. By embarking on CSR, the foreign business has the potential to increase their impact in the local communities as well as again social legitimacy.

2.4 CSR and small business in South Africa

Corporate social responsibility (CSR) is a multi-dimensional concept and has no universally accepted definition (Diale, 2014; Turyakira et al., 2012). CSR has become a strategic tool that the small business can use to enhance its market positioning and financial gains (Chazireni, 2017). According to Mukwarami (2017), CSR is a portfolio of actions which are taken to address social, economic and environmental sustainability challenges. The commitment of the businesses to ethically address sustainable development issues is expected to ensure that all the stakeholders benefit from the achievement of sustainable development issues. CSR has become a need across the whole business spectrum, and this is particularly true in South African, where communities face a myriad of socio-economic challenges (Diale, 2013).

The concept of CSR is mostly associated with big businesses in South Africa (Chazireni, 2017), particularly listed companies who are required by law to provide reports on their CSR activities (Solomon & Maroon, 2012). Even though CSR is a familiar concept across the SMEs spectrum, efforts to indulge in CSR activities are undermined by many factors such as inadequacy of funds, human capital with limited capacity and information gap (Hlatywayo, 2015). Some authors have noted that SMEs in the Gauteng province are far away from practising and learning CSR as issues to do with reporting to internal and external stakeholders are a challenge to many of them (Chiloane-Tsoka & Rasivetshela, 2014; Masarira, 2014). Concurring, Chazireni (2017) noted that the small retail and wholesale businesses in the EThekweni metropolitan area are reluctant to commit themselves to CSR practices because of the cost involved. Furthermore, they believe that only big firms should indulge in CSR and that SMEs have a lesser impact on the environment.

2.5 Rationale for CSR engagement by small businesses

The literature suggests that the motives for engaging in CSR vary from business to business, depending on the nature of activities. In most of the cases in developing countries, CSR initiatives are mostly guided by the legislative frameworks (Diale, 2014). In new South Africa, after independence, emphasises on accountability and transparency by the various agencies has influenced most of the reputable businesses to maximise their CSR engagements (Mukwarami et al., 2017). However, over and above, the rationale for CSR involvement, particularly by small businesses is not clear as most of their SMEs operators lack CSR understanding (Chiloane-Tsoka & Rasivetshela, 2014).

For the small business to be legitimately and socially accepted by the communities, the CSR concept has been seen as the most important factor which brings together all sustainable development dimensions (Mukwarami et al., 2017). According to the European Commission (2005) CSR categories for SMEs, include market-oriented CSR activities, workforce-oriented CSR activities, environment-oriented CSR activities and society-oriented CSR activities. However, it is up to the business to initiatives various CSR activities based on what they want to achieve at that particular time. The apparent rationale of CSR engagement by various firms are the benefits which accrue from their practices. While CSR benefits are multifaceted, it is fundamentally vital to explore if organisational legitimacy can be gained through engaging in CSR practices.

2.6 CSR categories and their benefits to SMEs

Although CSR is regarded as a cost to the company as per neo-classical economists' propositions (Jensen, 2001; Friedman, 1970), the opposing opinions are suggesting that by engaging in CSR programmes, countless benefits accrue to the business which would eventually result in a better firm performance (Mukwarami et al., 2017; Harper 2014). Beyond this, firms today use CSR to respond to various social, economic and environmental needs of their host communities as demanded by other government institutions (Diale, 2014). Since CSR plays a mediating role between firms and other groups of stakeholders, it can address a variety of concerns simultaneously. Given, the multifaceted CSR programmes which firms have been undertaking, the literature notes that every CSR category is associated with particular benefits, including value creation, managing stakeholders, creating a good business relationship, improving firm performance, attracting customers, and building a good reputation (Mukwarami, 2017; Harper, 2014).

2.6.1 Employee oriented CSR

Employees are an outstanding group of stakeholders who work towards achieving organisational goals. Employee-oriented CSR activities include training and skills, occupational health and safety, grievances resolutions, equal participation, financial support to employee, diversity and inclusivity in workplaces (Global Reporting Initiatives, 2013; Turyakira *et al.*, 2012). The available evidence confirms that CSR impacts positively on an employee's job satisfaction, motivation, commitment and productivity (Alshar, 2016). Looking at the skills gap in South Africa, particularly in the sector of small businesses continued efforts to ensure that entrepreneurs and their employees are equipped is critical to the sustenance of their businesses. Hence CSR is seen as a contributing factor to attracting and retaining skilled employees (Harper, 2014; Mukwarami, 2017).

2.6.2 Society-oriented CSR

Despite society being a secondary stakeholder, businesses have moral and, in some cases, the legal obligation to carry out CSR programmes that promote social solidarity. According to the Global Reporting Initiatives (2013), society-oriented CSR is not limited to fostering anti-corruption practices, anti-competitive behaviour, compliance with societal norms and values, resolving community grievances and building local infrastructure. Through implementing CSR activities, businesses can address social contract and legitimacy issues (Prno & Slocombe, 2012) which are expected to eliminate interruptions on businesses' operations (Brown & Geegan, 1998). In the same token, society-oriented CSR can prevent future litigations, which are associated with irresponsible behaviour and uncalled for mistakes (Isanzu & Fengju, 2016). Going by the preceding, one would expect that by engaging in societal orientated activities, foreigners may earn the social license to operate the townships.

2.6.3 Environment-oriented CSR

The environment is an essential aspect of sustainable development, and responsible entrepreneurship should focus on preserving it. Environmental monitors such as governments, non-governmental organisations, and society urge businesses to act responsibly by addressing the triple bottom issues. It is therefore expected that businesses should take care of the environment by ensuring that matters to do with water disposal, pollution, energy efficiency, the production of environmentally unfriendly products, water usage, and compliance receive not only maximum attention but considerable pro-active environmental responsiveness (European Commission, 2005; Global Reporting Initiatives, 2013). Besides compliance, environmental-oriented CSR brings many benefits, including counteracting other stakeholders' negative views and redressing the spoiled pictures (Diale, 2013), earning legitimacy and minimising risks (Mukwarami et al., 2017), improving access to financial assistance (Zeller, 2010) and building brand reputations and strengthening relationship with stakeholders (Ama-njoku 2012). From an

organisational legitimacy point of view, one may assume that small businesses in the local township stand to benefit more if they take care of the environment.

2.6.4 Market-oriented CSR

A business's stakeholders typically include the community, employees and competition. Market-orientated CSR would suggest adherence to the responsible behaviour, which includes: responsible competitive strategies, the safety of the products, products and service labelling, avoid corrupt collusion strategies (European Commission, 2005; Global Reporting Initiatives, 2013). These forms of social responsibility enable the businesses to earn a good reputation, which results in earning employee and customer loyalty (Harper, 2014) that will subsequently translate into organisational legitimacy. Given that foreign-owned businesses are often blamed for unfair pricing that has to lead to the demise of local businesses, adopting a market-oriented CSR agenda may provide a possible solution to their legitimacy problems.

2.7 Theoretical perspectives

The role of CSR in the success of a business today is clearly articulated by the growing need to balance the views of the primary and secondary stakeholders. The stakeholder alludes to anyone who is directly or indirectly affected by the activities of a business (Freeman, 2010). As such, the stakeholders can act as control agents in the business environment by punishing and rewarding the businesses for their actions. Even though one of the overarching objectives of conducting business is to increase the wealth of the equity holders (Friedman, 1970), there has been growing concern on the negative impact of business activities on the resources and the society resulting from an unrestrained quest for profitability. With the understanding that society has the potential to influence demand, most proactive businesses have adopted CSR practices in an attempt to remain relevant in the communities in which they operate.

Turning to South Africa, the sporadic attacks on immigrant-owned spaza shops paint a clear case of the disengagement of the business from their primary stakeholders who are its customers and native business people (Asoba & Tengeh, 2016; Mukwarami & Tengeh, 2017; Mukwarami *et al.*, 2018). Hence, the stakeholder theory is imperative in this discourse as it proposes ways of diffusing tension among the stakeholders.

Complementing the stakeholder theory, the legitimacy theory advocates that gaining a social licence to operate by the businesses is a prerequisite in running a successful business (Burlea & Popa, 2013). Because stakeholders have the power to influence the business activities, acting contrary to stakeholders' wishes and expectations are like acting against the objective of doing business. Given the uncertainties in the environment in which spaza shops operate, gaining a social licence to operate is critical in bringing peace, and adopting CSR is one of the ways of addressing the stakeholder expectations as indicated in the literature (Mukwarami *et al.*, 2017, Isanzu & Fengju, 2016).

3. Research design and methodology

3.1 Methodology

A descriptive research design was adopted to determine the various forms of CSR which have the potential to assist immigrant business owners in gaining the much-needed social legitimacy from the significant stakeholders like community member and native business owners. As an approach within the quantitative research paradigm, a cross-sectional questionnaire survey was utilised to collect the data that addresses the primary research objective. To Saunders, Lewis and Thornhill (2009) the quantitative approach involves data collection that generates and uses numerical data. A well-designed questionnaire containing questions framed along the 5-point Likert-scale (1

= strongly disagree to 5 = strongly agree) was utilised. Besides, the most popular dimensions of CSR, namely: social, labour, product responsibility, and environmental management practices were made the central themes of the questionnaire. The questionnaire was thoroughly piloted to test its relevance and adequacy in terms of its ability to record primary data from the participants (School learners, community members and immigrants business owners). The Statistical Package for Social Sciences (SPSS version 25) software was used to analyse the data, which were later on presented in the form of figures and interpreted as such.

3.2. Target population, sample size and sampling method

The population comprised of school learners, community members and spaza shop owners. The selection of these groups was informed by the perceived role that they play in the value chain and as stakeholders. Learners at High School X were selected as the school's catchment area covers Gugulethu, Nyanga and Phillippi, which are amongst the oldest Townships in Cape Town. Supplementing this, were community members selected from the surrounding areas and of particular interest were the parents who are selling in and around the school premises. Completing the sample frame were Spaza shop owners operating in these three areas. The diverse composition of the sample frame was informed by the need to represent the opinions of the majority of the primary stakeholders.

The purposive and snowball sampling techniques were utilised to reach the study's subjects. Adopting the stratified sampling approach, thirty-eighty participants drawn from the three groups (school learners, community members, and immigrant business owners) made up the sample size of 114 respondents.

3.3 Data collection and analysis

The researcher distributed and administered the questionnaires to school learners, community members and spaza shop owners. The Statistical Package for Social Science (SPSS) version 25, was utilised to analyse the data that was recorded on the 113 fully completed questionnaires. With descriptive statistics as the preferred output, the findings were clustered around social practices, labour practices, environmental management practices and product responsibility.

4 Findings and discussion

In line with the primary objective of the study, the results are presented in the form of graphs, with each figure representing each CSR category.

4.1 Environmental Management Practices (EMPs)

Ensuring that the environment is well taken care of is a civic responsibility. As an essential component of CSR, customers are always willing to establish how businesses relate their operations to the ecological environment to improve the liveability and sustainability of the communities.

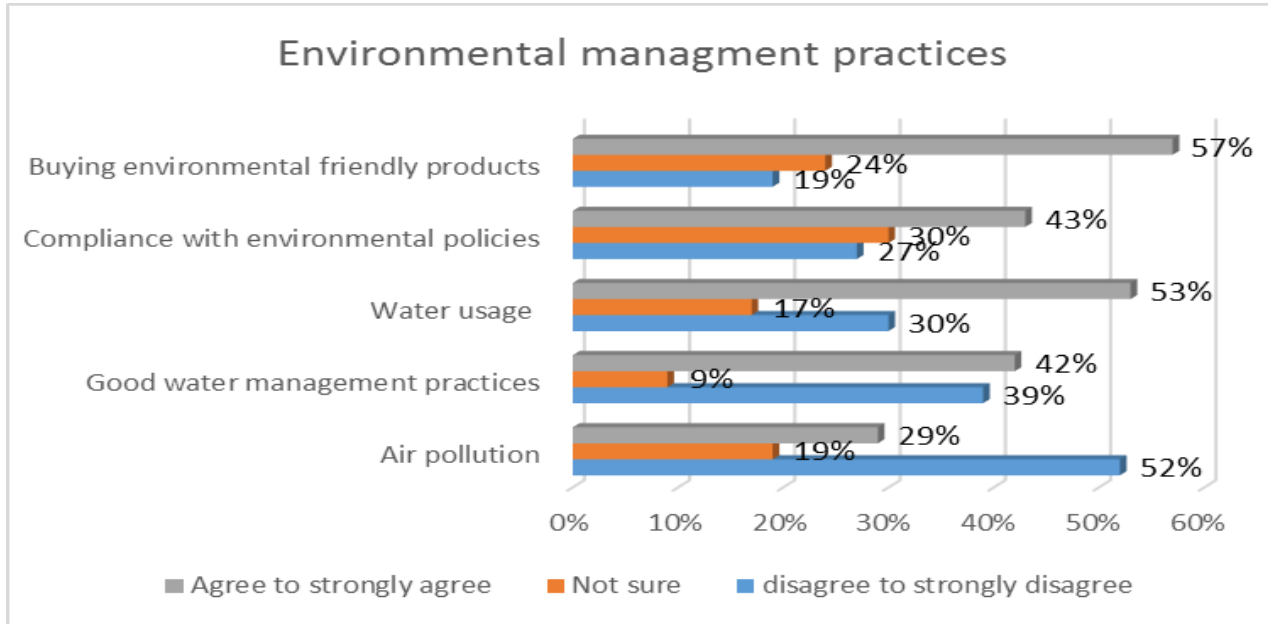


Figure 1. Environment- based CSR practices

The results (Figure 1) confirm that a majority of respondents agreed that spaza shops sell environmentally friendly products (57%), comply with environmental policies (43%) and water usage (53%). This notwithstanding, air pollution was regarded as a significant challenge among the spaza shop owners as 52% of the respondents disagreed. In sum, the findings reveal that small businesses operating in the local Townships have indeed made great strides in addressing environment-based CSR within their host communities.

The CSR behaviour of small businesses is consistent with the views of Mukwarami (2017) and Ama-njoku (2012), who stressed that CSR initiatives are critical in managing stakeholder relationships and improving their reputation. The level of environment-based CSR among the small business is contrary to Chazireni (2017) who found out that small firms exert a lesser impact on the environment.

4.2 Society-based CSR

Business and society are interlinked, thus suggesting that no business can progress while development in society is regressing. Businesses that embrace CSR ensure the existence of a sustainable relationship with their surrounding communities.

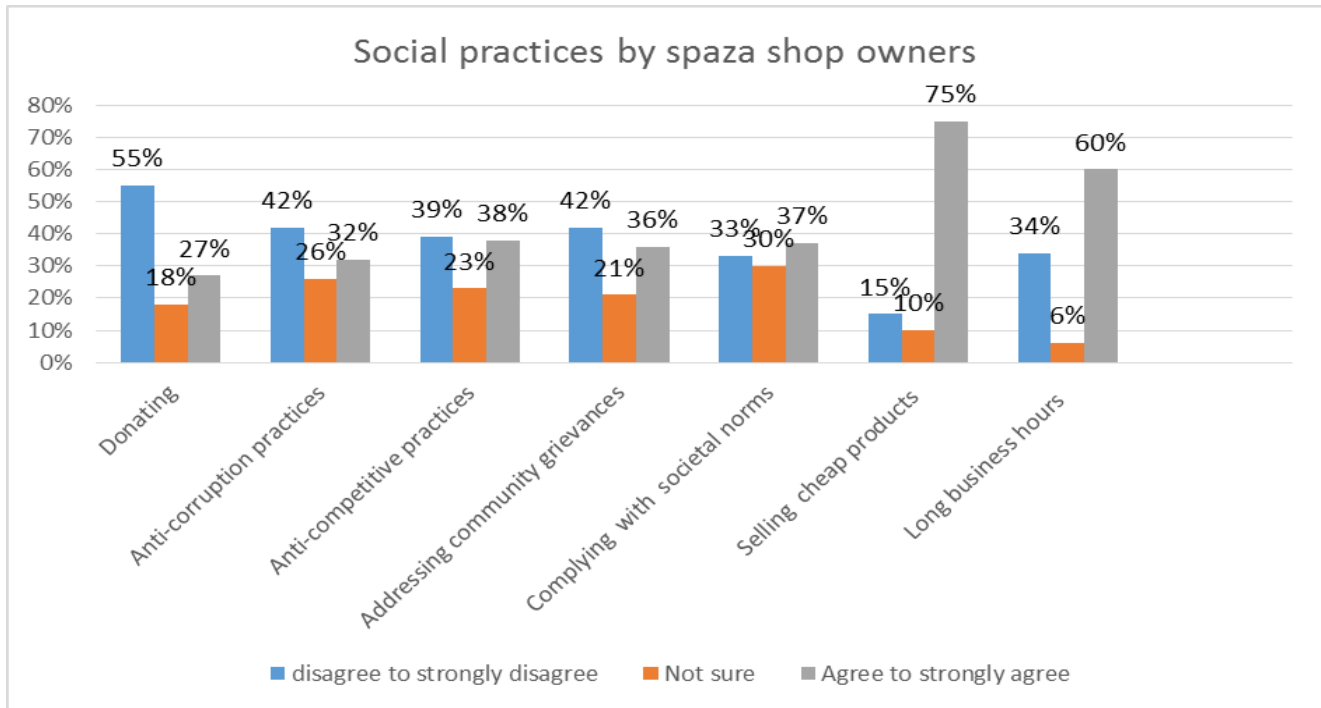


Figure 2. Society-based CSR by small businesses

Social practices provide a link between business and society. Concerning social practices, 75% and 60% of the respondents agreed that immigrants sell similar cheap products and are open for extended business hours which is good for the community (see Figure 2). These form of society-based CSR is consistent with the findings of Liedeman et al. (2013) and Mukwarami *et al.* (2018) who pointed that immigrants sell cheap products to customers and business hours are convenient to the members of the communities as they open for an extended period. However, about donating to the local communities, the findings show that a majority of the respondents disagreed as demonstrated by 55%. Small businesses can only improve their image through honouring social practices such as giving back to the community in the form of donations (Masarira, 2014).

However, insignificant donation coming from small businesses might be due to limited financial resources as indicated in the literature (Hlatywayo, 2015). Failure to address community concerns by the small business is exhibited by 42% of the respondents who disagreed. This, however, proves the existence of a void in terms of understanding between the business and the society as claimed in the literature (Chiloane-Tsoka & Rasivethsela, 2014). Furthermore, the results suggest that immigrant's shop owners (39%) are involved in practices, which promote competitive behaviour, which native businesspeople complain against (Mukwarami & Tengeh, 2017; Mukwarami et al., 2018). Moreover, issues like anti-corruption, anti-competitive behaviour and addressing community grievances are proving to be a daunting task for small businesses. Society-based CSR is one aspect which deals with legitimacy matters. With a particular reference to the results shown in Figure 2, the society-based CSR by the small businesses is not in line with the views of Prno and Slocombe (2012) who posit that businesses can address social contract and legitimacy issues. Additionally, Brown and Deegan (1998) stress that responsible CSR behaviour eliminates interruptions on businesses' operations.

4.4 Labour practices

Employment of the Natives is one of the areas of concern in the discussions around the effectiveness of local economic development. Hence, small businesses are expected to practice good labour relations.



Figure 3. Employee-based CSR by small businesses

As pointed in Figure 3, 61% and 53% of the respondents dissented that immigrants offer business training to locals and employed locals, respectively. This confirms that immigrants are not ready to transfer business skills to the local, thus finding themselves in a compromising position in terms of co-existing peacefully with local people. While failure to employ local people show some form of mistrust by the locals. Whereas 48% and 41% of the participants conceded that immigrants are useful in resolving labour grievances and promoting gender diversity, only 35% of the participants agreed to the statement.

Maintaining good labour relations assist in fostering good relationships with the employees. Overall, in terms of employee-based CSR, immigrants are still far from complying with the labours issues in South Africa. Their CSR behaviour is in contrast to many studies, which advocate for the employee-based CSR as a tool for attracting and maintaining skilled employees (Alshar, 2016; Mukwarami, 2017).

4.5 Product responsibility practices

Most of the small businesses in the local townships trade in goods. It has been noted with great concern that product responsibility among the immigrant shop owners is far from being accomplished as specific quotas of the society complain about the selling of expired products.

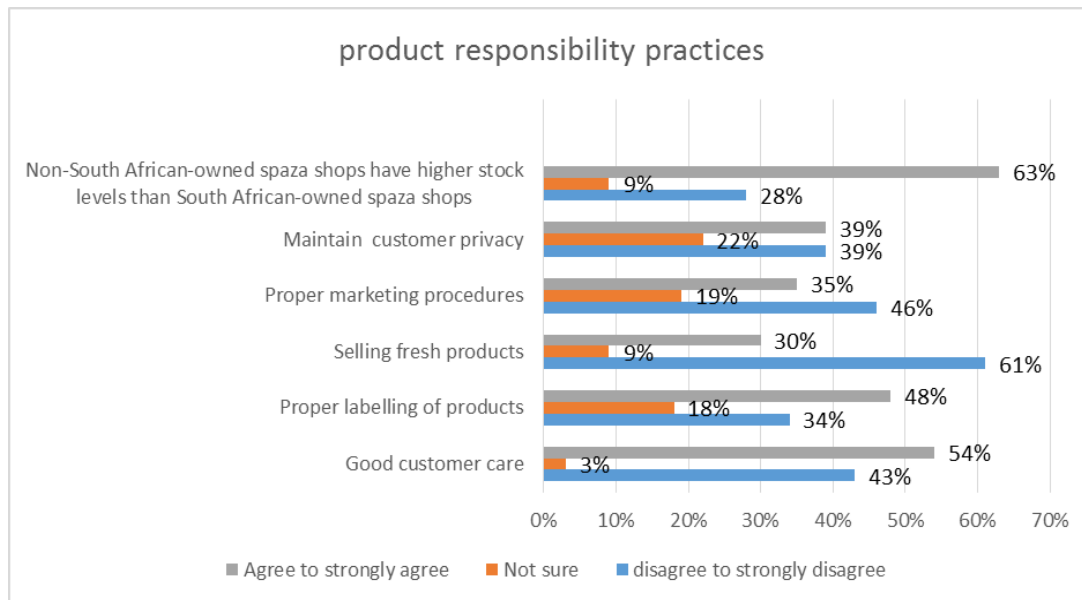


Figure 4. Product responsibility practices by spaza shops

The findings shown in Figure 3 casts some suspicious in terms of whether spaza shops in Townships deal in fresh products or not as 61% of the respondents disagreed to the point of selling fresh products. On the same note, immigrants operating in Townships do not follow proper marketing procedures as evidenced by 46% (Figure 4) of the participants alluding to the fact. Concurring, the findings in Figure 2 indicated that small business owners are involved in anti-competitive behaviour and corrupt dealings. Furthermore, most of the respondents (63%) noted that spaza shops rarely run out of stock as they keep very high levels of stock. This finding is in line with that of Liedeman *et al.* (2013) who acknowledged that immigrant spaza owners buy a variety of items in bulk and therefore able to sell cheaply to their customers. Customer care and proper labelling of the products are some of the product responsibility practices, which respondents acknowledged. In sum, product responsibility practices by spaza shop owners vary, with the issue of selling fresh products and following marketing procedures requiring more attention.

5. Conclusion and recommendations

Notwithstanding the contributions that immigrant entrepreneurs make to the growth of the township's informal economy, native business operators in South Africa have come to blame them for methodically taking away business opportunities from them through unfair business practices, while other sections of the community regard immigrant grocery shop owners as being socially irresponsible. Against this backdrop, this paper gauged the business practices of African immigrant spaza shop owners in the hope that the adoption of responsible business practices could ease the tension between both parties. Contrary to the view that associates environment-based CSR with big businesses, the results indicate that the immigrant entrepreneur studied are very conscious of the environment and have adopted environmental management practices, particularly in the area of water usage and dealing with environmentally friendly products. In terms of social practices, it was found that immigrant-owned businesses are not doing enough in terms of donating to the communities, promoting anti-competitive and condoning corrupt practices. More importantly, CSR practices which are based on labour practices remain questionable as issues to do with; employment of local people and offering business education, and training received the highest level of condemnation as the majority of the participants disagreed. Contrary to other results under product responsibility, immigrant shop owners are perceived to be selling cheaper products than their native

counterparts. On the same note, the participants projected some anger as they asserted that immigrant-owned businesses sell expired products.

From the results, it is clear that small businesses are yet to embrace the concept of stakeholder theory in that the most critical CSR variables (Such as employment of local people, anti-corruption, anti-competitive behaviour, training and education, selling fresh products, donating to the local communities) require attention as these have the potential to bridge the gap between local and immigrants.

This paper contends that CSR initiatives are essential in ensuring that immigrant-owned businesses manage their stakeholders effectively and enable them to gain some form of social legitimacy within the township environment. However, there are concerns that small businesses are still grappling to understand the concept of CSR let alone overcoming the myriad of obstacles surrounding their engagement in CSR programmes. This, notwithstanding, this paper extends the idea of CSR, which is predominantly associated with big businesses to informal businesses owned by immigrants. In what we term responsible or accountable entrepreneurship, this article argues that doing well does not preclude doing good. In particular, we acknowledged that conscientious entrepreneurship requires that they make a positive contribution to society while minimising the adverse impact on people and the environment; showing concern about the well-being of employees and consumers; treating customers and competitors fairly; serving as good citizens in the local community and preserving natural resources and the environment. Conversely, attacks on immigrant entrepreneurs' grocery shops signal a pending social contract that, if approved, the disengagement between natives and immigrants operating businesses in the townships is likely to be resolved. As such, the study recommends that immigrants operating businesses in the local townships should consider deepening and broadening their CSR practices to counter the rising tensions.

6. Limitations of the study and suggestions for future studies

Although the area that has been covered by the study is quite extensive in terms of coverage, perceptions of the participants cannot be generalised across all the townships in South Africa. Even so, the participation was limited to 114 participants comprising of learners, community members and the immigrants that operated businesses in the selected local Township. However, future studies may consider involving policymakers in local government and other political leaders, as this will provide a holistic picture of the state CSR in the local townships.

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Silas MUKWARAMI is an experienced educator with over five years of teaching experience in Zimbabwe and South Africa. He holds a Diploma in Technical and Vocational Education from the Chinhoyi University of Technology. He also has a BCom (Honours) in Accounting, Masters of Commerce degree and he currently studying towards Doctor of Commerce (Accounting) degree at the University of Limpopo in South Africa. He has published an article on corporate social responsibility and is working on several projects in the area of sustainability and entrepreneurship. He has a specific interest in the areas of accounting, sustainability, and small business management.

ORCID ID: <https://orcid.org/0000-0002-5812-4722>

Robertson K. TENGEH is an Associate Professor of Entrepreneurship and the HoD of Entrepreneurship and Business Management at the Cape Peninsula University of Technology in South Africa. He has published over 60 articles in peer-reviewed journals. He has also authored book chapters and technical reports. He has presented papers at both local and international conferences. He has supervised and examined considerably. He sits on the editorial board of many international journals. Within the broad areas of entrepreneurship and management, his research interests include immigrant entrepreneurship, entrepreneurship development, entrepreneurship education, small business management, and strategic management.

ORCID ID: <https://orcid.org/0000-0003-2485-0205>

Josephat MUKWARAMI is an educator, trainer as well as a researcher based in Cape Town, South Africa. Grew up in Zimbabwe, where he received teacher training at the Chinhoyi Technical Teachers College (1997), majoring in Accounting and Business Studies. He is the holder of the Masters of Technology: Business Administration, Bachelor of Technology: Business Administration, Bachelor of Technology: Education Management, Diploma in Education, and an Executive Diploma in Business Leadership. He taught in Zimbabwe for eight years, and in 2006 he moved to Cape Town where he lectured for two years. In 2008, he got a teaching job with Department of Education in Cape Town, and a teaching job he still holds to date. He has a particular interest in entrepreneurship with an emphasis on small businesses, an area that he has published four articles to date.

ORCID ID: <https://orcid.org/0000-0002-3152-0717>



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SYNERGY - AN ENHANCEMENT OF LEARNING ORGANISATIONS UNDERGOING A CHANGE*

Monika Jasińska

*Siedlce University of Natural Sciences and Humanities, Faculty of Social Sciences,
Konarskiego Street 2; 08-110 Siedlce, Poland*

E-mail: monika.jasinska@uph.edu.pl

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Abstract. Innovative development of an organisation requires good management practice based on introducing creative solutions, this however can only be possible by making each member of the organisation aware of the value of team learning. This ability to build a creative environment, by means of an apt quality of teamwork shaped by good cooperation and its benefits, especially during a time of change, produces opportunities for better adaptation and distinction of an organisation. By developing the team's activity, one can achieve an enhancement effect - the synergy. The aim of the article is to verify the mediation hypothesis on the mediative role of synergy in the team's relations between the team work and the improvement of learning organisation. Thus to present relevant arguments, mixed studies, based on group interviews and a diagnostic survey, were performed. The study applied methods of statistical analysis determining the correlation coefficient factor analysis (CFA) and regression analysis. Consequently, it was noticed that synergy emerging on the basis of high quality teamwork strengthens the impact of team work on improving the learning organisation by introducing innovative changes. It was also found that the management method promoting proactivity supports the development of entrepreneurial activities in a team, but it does not have a direct impact on the synergy in a team. The study showed that the quality factors of teamwork are supported by social potential, which is important for shaping the level of team working in a learning organisation.

Keywords: activity; team work; synergy; change; social potential; team learning

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1. Introduction

With the social and economic growth there is a need to make space for creative and entrepreneurial activity. The space is available in the knowledge oriented organisations, which cooperate on different levels both externally and internally, all to create the new quality of knowledge. In the even an organisation reaches the ability to use the potential of knowledge and experience gained on the basis of joint action it increases its power to adapt to the changing environment. Under these circumstances, the change should be considered a key process and source of progress. In order to generate positive social, economic and technological effects when implementing a change one should take into account the assumptions of the concept of sustainable enterprise, learning organisations and leadership.

New, changeable and dynamic reality puts many development challenges and opportunities for organisations and people functioning in them. On the other hand, it also carries many threats and limitations, which could be alleviated provided everybody starts working as a team. Therefore, the development of the concept of real changes in an organisation requires a system approach, thinking in terms of achieving a joint effect and great diligence at the stage of determining the direction of change. Hence, the commitment of each participant in the organisation and their ability to react properly to change (Sange P., 2014) is the required foundation.

Effectiveness can only be achieved if the participants in the change process are aware of where they are going and what they are supposed to achieve. Organisations defining their way of development should develop their own model of action, which will not only determine their effectiveness, but also differentiate them and take the role of a creator of change. In this context, organisations adhering to new directions of action must take into account the essential elements determining the efficiency of functioning. Above all, however, they should take up the challenge of implementing innovative changes. The organisations that create perspectives for dynamic development using new technologies, the ability to mobilise knowledge and social potential, and novelties owe their success to innovation (Tidd J., Bessant J.R., 2018; Benešová, D., Kubičková, V., Michálková, A., Krošláková, M. 2018).

Any organisation undergoing an innovation process, which is an intricate social procedure, faces challenges with respect to building and using team working, i.e. the essentials to enhance learning opportunities for the sake of mutual improvement. While engaging in the changes, the team working creates the foundation for emergence of cognitive openness, creativity in team work, team learning or entrepreneurial action. A well-organized teamwork enables the potential of team working people, increases their activity and efficiency. In a learning organisation, the value of teamwork is created based on knowledge sharing, namely knowledge conversion, which increases the possibility of creating good conditions for synergy. Given all that, it is the synergy that reinforces team work and an expresses high-quality relations. The synergy as an effect of people's activity in team work creates team's strength and increases the ability to generate creative solutions. Thus, it can be concluded that the effect of synergy in team working facilitates and accelerates the process of innovative changes, which is an additional contribution to the development of all an organisation, a team and each unit participating in the process.

2. Progress fundamentals of learning organisations

When preparing their strategies, development and competitive advantage oriented organisations include programs and follow-ups for continuous improvement and refinement of efficiency (Park S.H., Zhang Y., Keister L.A., 2019; Jelenic D., 2011; Kaur S., 2015). This approach requires certain commitment level of all stakeholders in the process of mutual learning (Bratianu C., 2015). Business practice itself makes a visible connection between continuous improvement and learning organisation (Rusly F.H., Corner J.L., Sun P., 2012; Loermans J., 2002). The majority of learning organisation concepts show that organisational learning should be considered a complex process that is created and implemented at a given time. In order to conduct the procedure, one must either get the

know-how from external experts or try to use its own assets (King W.R. (ed.), 2009). The organisational learning triggers better performance of people, teams and the entire company (Garvin D.A., 1993).

Now, when attempting to interpret definitions of a learning organisation, their diversity cannot be unnoticed, they pay attention to different dimensions that are significant from approach, measurement, and evaluation perspectives. Generally, it can be assumed that a learning organisation is capable of creating, acquiring and transferring knowledge (King W.R., Chung R.T., Haney M.H., 2008). It can modify behaviours in order to create a new quality of knowledge and good practice (Senge P., 2014). New ideas expressing creativity base on illumination, sharing insights and experiences during team working. They are a compilation from various sources of knowledge, and this makes them necessary to initiate the learning process. Regardless of the source, the goal of the ideas produced is to improve organisational activities and develop custom solutions to emerging problems. Creating only ideas, however, is not enough to build a learning organisation. In this aspect, it is necessary to introduce changes in thinking, behaviours and actions.

In the learning organisations environments people systematically develop their ability to create the consciously defined and achieved results, which motivate progress (Černevičiūtė, J., Strazdas, R. 2018). These organisations provide the space for promoting and implementing new thinking patterns (Senge P., Kleiner A., Roberts Ch., Ross R., Roth G., Smith B., Guman E.C., 2007), they trigger collective aspirations, and prompt people to constantly learn how to study together (Senge P., 2014). Learning new knowledge, in learning organisations, is a way of conduct, life, where everyone is a knowledge worker (Nonaka I., 1991). Therefore, team learning is an exceptional value that creates a high quality of social potential in an organisation. That potential is capable of converting knowledge, openness, cognitive flexibility, and knowledge sharing (Huber G.P., 1999). The management foundation of learning organisation must build sufficiently collaborative work environment, that skilfully combines the generation and exploitation strategy which in turn establishes favourable conditions for the emergence of synergy in team work (Corning P., 1996; Corning P., 2018). Thus, the culture supporting social capital and team work is indispensable (Maull R., Brown P., Cliffe R., 2001; Jasińska, 2019(2)). Its strength comes from the fact that it emerges naturally on the basis of high-quality cooperation and mutually reinforcing interactions, i.e. well-arranged relations (Jasińska M., 2015).

The development pillars of learning organisations are knowledge and innovation, which find their grounds in creativity, entrepreneurial actions and team work (Albrecht, 2003; Jasińska, 2019(1)). These are the elements, that in the conditions of change and the complexity of the organisation's environmental relations, can be considered the most important forces stimulating efficient and creative action (Černevičiūtė, J., Strazdas, R. 2018). They also encourage creation of new solutions, generation of new quality of knowledge and production of added value.

Often, companies with classic profiles, expect innovation, so it is no longer just a domain of the so-called advanced technologies (Tidd J., 2012). The growing role of creativity in many economies means that in complex systems (society, organisations) in which the ethos of creative work is more and more dominant, innovation becomes a natural mechanism for the development of the whole, but also of individual parts of the system (Florida R., 2014). The direction of innovative changes, strengthened by the building of high-quality social potential, creates the perspective of well established and sustainable development. This is an additional boost and a safety increase factor. Innovation in an organisation is a process in which ideas become a reality and generate tangible benefits for the organisation (Tidd J., Bessant J.R., Pavitt K., 2015). In this context, innovation needs a specific space for its development, so that it can exist and be a force pushing improvement in an organisation. It is a set of elements comprising a larger system since it changes both the individual elements and the entire system (Tidd J., Bessant J.R., 2018).

Innovation means gaining knowledge, opening to new opportunities by matching and combining different sets of knowledge, which, we cannot forget that, often takes place under conditions of uncertainty. Activities related to

innovative development require giving impulse for change and presenting a vision defining the direction and ways of its implementation. At this stage, it is important to properly reinforce the leaders of change and motivate employees to participate in it. The role and challenge for managers, using combination of ideas, knowledge and skills to obtain a new value, is to shape appropriate conditions for synergic action,. Learning organisations, especially in conditions of innovative changes, require a clear determination of the forces that mobilise their functioning and development. Figure 1 presents the relationship between the factors constituting the basis for the development of a learning organisation, which will be under empirical analysis in the following part of the article.

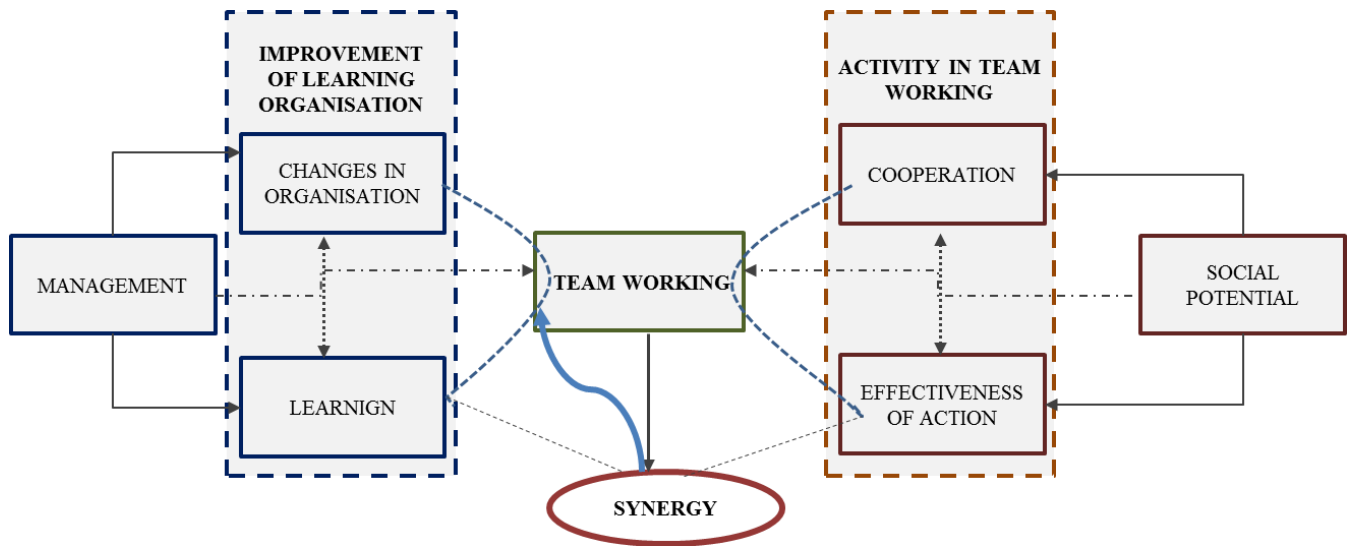


Fig. 1. Enhancing factors of learning organisation undergoing a change

Source: own study

3. Research Methodology

The procedure of identifying and analysing the premises for the occurrence of synergy in team work was carried out on the basis of three stages and each contributes significantly to exploring the knowledge about the conditions of the synergy phenomenon. Additionally, they are important for successive empirical actions, thus maintaining an appropriate structure of actions. The research and analytics, determined in the sequence, constitute the ending point, and also the observation of new dimensions of the analysis. Due to the complexity of the process of determining and analysing the prerequisites of synergy in a team, this article is an indication and a summary of the most important results of qualitative research. The main analysis (quantitative study) presents some of the case study ("P-M" company) results of the preliminary research stage. The layout and effects of individual stages of the study are presented in Figure 1.

The "P-M" company has been selected for the study due to the experience in the implementation of joint projects, which naturally was an excellent starting point to get good knowledge on how it operates, its directions of change, and awareness of strengths and weaknesses. In other words, all that helped in the consolidation of knowledge about building teamwork in a company. In addition, the general profile of operations has awakened the cognitive

curiosity while selecting the study subject, since the "P-M" company is distinguished by its complexity in terms of: the scope of operations, implemented tasks, created processes, relations with the surrounding, a large diversity of teams, and company's size (big). Based on the management method and the applied development philosophy, it can be assumed that the "P-M" company operates by principles of the learning organisations. This example of the complexity of the company's operation was considered important and potentially tempting to explore the synergy conditions in a team.

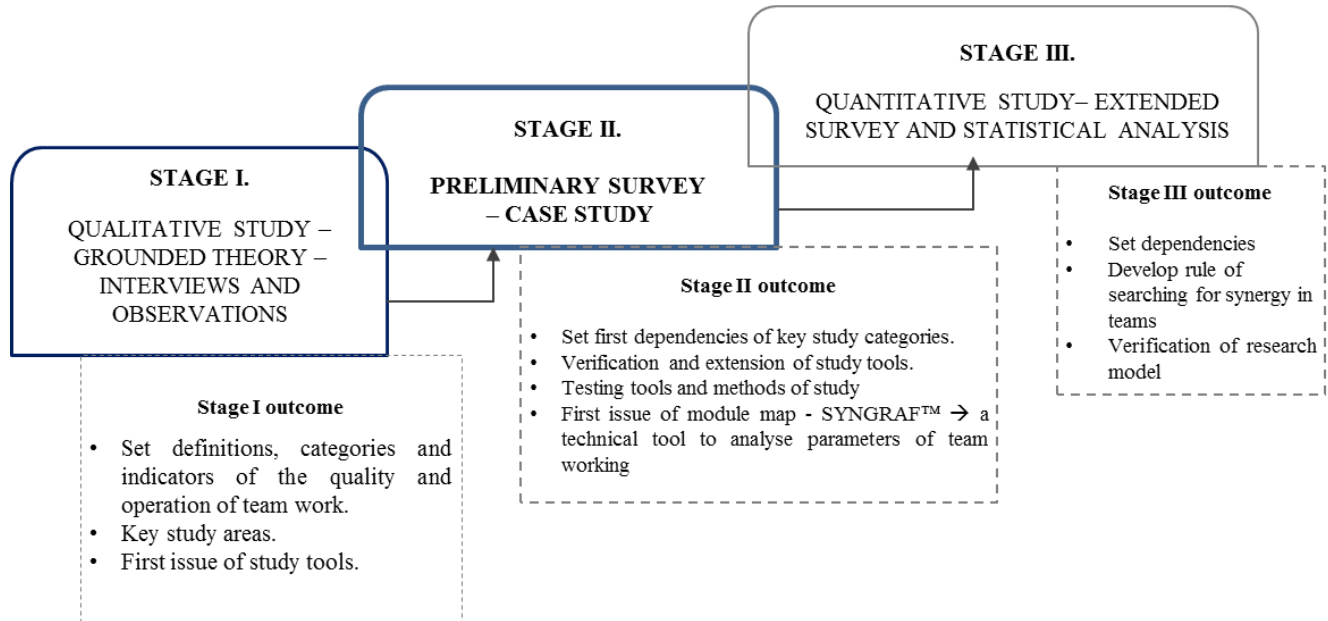


Fig. 2. Research stages in the analysis procedure of synergy conditions in a team

Source: own study

The first action in the process was to recognise the importance of teamwork in the development of an organisation. In this aspect, the potentially important empirical areas have been identified in order to enable implementation of further stages of the procedure and data analysis (Jasińska, 2019(1)). The results of this part of the proceedings encouraged and gave directions for the qualitative research, which has been performed by means of the grounded theory (Konecki K.T., 2011). Implementation of this strategy is based on in-depth individual and focus group interviews as well as participant observation. The sampling took place in the natural environment of teams' operations, observing the principle of saturation of the theoretical material (Charmaz K., 2014). The collected data was transcribed, verified and developed in accordance with the principles of qualitative analysis, based on the grounded theory procedure (Konecki K.T., 2009).

The exploration and description made it possible to build categories that were used in the development of code sheets and subsequent study scenarios. The value of the defined during the field study concepts, phenomena, the most characteristic behaviours, the determination of the first significant dependencies, derives from the description of the directly observed and surveyed group of employees cooperating with each other in a team. The procedure under the grounded theory was one of the most important steps in the research process. It allowed, in addition to recognising the basis of the quality of teamwork, to determine the main variables, indicators and characteristics validating the conditions of synergy in a team Jasińska, 2019(1)). And at the stage of preliminary

surveys, these conditions were examined and verified, and then, in the main study (stage III of the procedure), analysed.

A total of 88 interviews (73 individual and 15 group) conducted with members of 22 teams over 140 hours (average interview time 97 minutes), with an active participation of 214 people was the real chance for natural observation of team work. The selection of teams was intentional and based on a list prepared by the HR department. That list was used to select study teams meeting three basic criteria: size, type and level of efficiency at work. Table 1 presents the features of teams participating in the study, all in accordance with the strategy of grounded theory.

Table 1. Characteristics of teams in individual and focus group interviews

Size, type and efficiency level	Number of teams (number of people)	Gender		Age				
		F	M	> 30	30-39	40-49	50-59	≤ 60
In-depth individual interviews - N = 73								
small ** / * (pj)	2 (12)	9	3	-	2	8	1	1
average ** / ** / * (pj)	3 (23)	11	12	1	9	10	3	-
big ** / * (pj)	2 (24)	15	9	-	10	11	3	-
Managerial staff	- (14)	6	8	-	3	7	4	1
Group interviews - Focus group - N = 141								
small ** / ** / ** / ** / * (m, pj, ts, o, a)	5 (27)	13	14	-	10	13	3	1
average ** / ** / * / * / * (m, pj, ts, o, a)	5 (38)	21	17	2	18	13	4	1
big ** / * / * / * / * (m, pj, ts, o, a)	5 (76)	43	33	5	31	24	13	3
S (N = 214)		118	96	8	83	86	31	6
<ul style="list-style-type: none">Team efficiency level: ** high level of efficiency; * moderate level of efficiency.Type of teams: managerial (m), project (pj), trouble shooting (ts), operational (o), advisory (a).								

Source: own study.

The first step included in-depth individual interviews, which were conducted with members of 7 project teams (73 people) and both senior and middle managerial personnel (14 people). Alongside the collection of empirical material, in form of notes, it was transcribed, coded and analysed. The focus group interviews, effected on 15 (141 people) proportionally selected teams, were an extension and supplement of the entire process. Following the 3 set criteria, the following teams participated in the second part of the qualitative study: 5 teams - big, medium and small, and 3 - design, management, advisory, operational and trouble shooting teams.

The data was both audio (voice recorder) and notes and it was used to elaborate the coding principles and the code sheet. This procedure established the main research categories and frequency of indicating them. Additionally it interpreted the approach and identified manifestations of synergy phenomenon. That was the basis for a

qualitative statistical analysis using the method of assessing basic dependencies - the rho-Spearman correlation coefficient. Employing the knowledge obtained in the qualitative study, and the results of analysis, the first version of the research tools set was developed. The questionnaire consisted of 120 statements identifying the level of teamwork and 20 describing the way of managing and the company's standing. Furthermore, to measure individual features, a 5-point Likert scale was used, assuming that 1 is the lowest and 5 the highest value.

The results of qualitative research analysis triggered the second stage of the research procedure - preliminary surveys. The aim of the work was to verify the reliability of research tools and determine the key factors defining the quality of team work and development of an organisation. Using the method of a diagnostic survey, 200 people - members of 22 teams who were involved in individual and group interviews were studied. Taking into account the characteristics of the research sample, respondents differed among themselves in terms of gender, age, level of education, seniority, time of working in a team and experience in team work.

The main direction of the analysis was the willingness to explore interesting relations and phenomena of data segmented for analysis. One of the dependencies of special empirical interest is: Synergy in a team arises on the basis of high quality teamwork and activity in a team work. In this context, quantitative methods of analysis, based on the assessment of dependences according to Pearson's correlation coefficient, determining factor loadings based on confirmatory factor analysis (CFA) and preparation of basic statistics description - arithmetic mean, SD and determination of V-variation coefficient, have been used. The next stage of the quantitative approach was multiple regression analysis. The goal was to determine why the activity in the team work is the improving drive of learning organisation. Thus the question: is synergy (in the satisfaction

approach as a qualitative measure of synergy in a team) a mediating variable supporting the influence of high activity in team work on the direction of improvement in a learning organisation? Regarding the established knowledge, the assumption was made: Synergy (measured by a qualitative measure - satisfaction*) an enhanced outcome of high activity in a team work reinforces the improvement of learners' organisations in terms of innovative changes. The regression analysis was used to verify the mediation hypothesis on the mediative role of synergy in the team's relations between the team work and the improvement of learning organisation. A mediating model was developed according to the scheme shown in Figure 3.

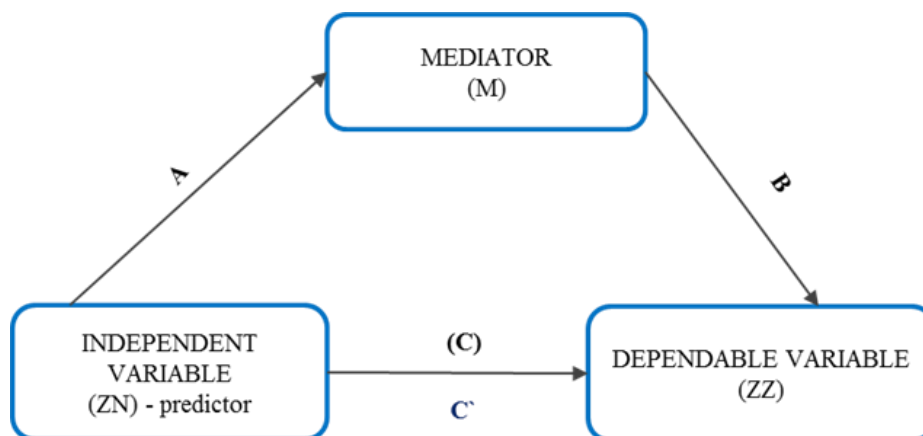


Fig. 3. Diagram of relations in the mediation model

Source: own study.

The Statistica 10 program was used to perform calculations in the scope of quantitative data analysis.

4. Interpretation and result

In the article, the analysis of research results consists of two parts, including the research plan presented in Figure 2. Due to the importance of the acquired material in the context of the entire process, the first result presentation path refers to the summary of the qualitative research stage. Its main area of analysis focuses on the recognition and description of the basic conditions conducive to the occurrence of synergy in team work. The results and their interpretation are the starting point for the next part - the preliminary surveys. The intention of the exploratory activities of the second analysis path is the quantitative approach to the issue and presentation of key relations in determining the conditions for the occurrence of synergy. At this stage of the research, an attempt was made to determine the strengthening role of synergy in teams in the context of the relations activity in team work - improving the learning organisation. Thanks to the case study method, in addition to the survey method of data collection, the natural teamwork environment was directly observed, which allowed to understand and justify the obtained results of the study. The effects of the two analysis paths presented in the further part of the article are a reference point for extended studies. The aim of the third stage of research is to compare the conditions of synergy in different teams and organisations and to explain the nature of the synergy mechanism (the results of the third stage of research will be the subject of other articles).

Path of qualitative analysis results

The grounded theory used in qualitative research has enabled the emergence of concepts, characteristics and indicators important for team work. 7 categories were defined at the sampling stage, and they included (Jasińska, 2019(1)): the quality of relations being shaped, the basis for building teamwork, the effects of team work, team activities, management activities in building teamwork, the course of cooperation and a special type of satisfaction* based on team work. The added value, obtained thanks to the grounded theory strategy, is a proposed definition of synergy, which indicates that: *Synergy is the phenomenon of an enhanced outcome (an intensification result of factors interaction) versus the summ of the end-result of individual factors (quality of teamwork). This type of energy generated in the team is an additional contribution to the quality of working together. Synergy is a feature emerging at the level of the excellence of teamwork, the state of greater effects obtained through the growth and use of free and enhanced in the team work activity.*

Based on the results of two research stages, it was assumed that the satisfaction(*) of team work is the quantifiable quality measure of synergy. This is the value that the team achieves as a common benefit based on high activity and quality of joint operation. Such satisfaction* can be treated as a "bonus", that improves the result of team work, and happens also thanks to the ability to implement and develop potential in a team, which in the end translates into the desired creative behaviour and innovative action (Jasińska, 2019(2)).

Another effect of qualitative analysis is obtaining empirical evidence, which indicates that the basis for increasing the effectiveness of learning organisation is effective cooperation and proactive behaviour. It was noticed that in the aspect of building the openness and the activity in cooperation, the high quality of relations ($r_s = 0,75$), satisfaction ($r_s = 0,73$) and mobilising the effects of team work ($r_s = 0,84$) are significant (Jasińska, 2019(2)). The main assumption, being part of the overall theory (problem and research hypothesis), emerges as the result of qualitative analyses, which consolidates the knowledge gained at this stage of the research, and at the same time opens new possibilities for further research and analytical activities: What conditions of team working are conducive to the emergence of synergy in a team? On the basis of the collected data and observations, it was assumed that: The quality of team work, by means of ensuring appropriate potential, level of relations and stimulating co-operative activity, creates opportunities for synergy. The final step of this path is to construct a set of research tools for the second stage of the study, which prior the third research stage shall be verified.

Path of quantitative analysis results

The second stage of analysis is related to the application of quantitative methods used to verify the assumptions. The statistical analysis of the survey results was based on: Pearson's r , confirmatory factor analysis (CFA), basic statistics (arithmetic mean, SD, V), and multiple regression analysis. Cronbach's alpha was used to evaluate the reliability of individual measurements of scale. The first part of the quantitative analysis summarises the indication of the synergy conditions synergy in a team, while the second concerns the interpretation of results, which are an argument for recognising synergy as a strengthening force in improving the learning organisation, especially in conditions of innovative changes.

The conditions for the emergence of synergy in a team, as described in the five main variables, are evaluated in terms of determining the factor loadings (CFA) values (Jasińska, 2019(2)). The results of the confirmatory factor analysis model prove the achievement of high values of loadings for each of the five variables, because they exceed the desired value of 0,7. Moreover, the high result obtained by verifying the internal consistency of the tool is also the confirmation of the quality of the conducted estimation of these variables. The conditions of synergy are best described by the effects of team work (0,922; $\alpha = 0,914$) and cooperation (0,905; $\alpha = 0,854$). The second tier, in the assessment of factor loadings, indicates satisfaction* (0,866; $\alpha = 0,832$) and the quality of the relations (0,835; $\alpha = 0,797$).

Another evidence for the quality of the model's estimation is the high assessment of the dependence between the five variables that explains the conditions for the emergence of synergy in a team. Based on the results of the study, we can indicate the three most characteristic, and yet, the strongest correlations concerning relationship: effects of team work - satisfaction* ($r = 0,807$); cooperation - satisfaction* ($r = 0,798$) and cooperation - effects of team work ($r = 0,796$). Thus it confirms that in order to create favourable conditions for synergy when building teamwork quality, one should consider, the 3 co-reinforcing factors: cooperation, effects of team work and satisfaction*. Using the basic statistics of the conditions of synergy emerging in the team, assessment of SD parameters and variability coefficient V, it can be assumed that the results of the studied group indicate quite low variability and variation (standard deviation results range from 0,284 to 0,524 and V from 7,35 to 13,1).

The analysis of the regression model proved that the equation describing the impact of teamwork quality on satisfaction* (in relation to joint action) is statistically significant ($F = 142,489$ and $p < 0,000$). On top of that, a good match between 4 independent variables (entrepreneurial potential, quality of relations, cooperation, effects of team work) defining the quality of teamwork, which in 74,5% validate the qualitative measure of synergy in a team, presented in the form of a dependent variable - satisfaction* ($R^2 = 0,745$), is also visible. Each of the 4 independent variables obtained a high statistic F and $p < 0.001$ values. The most important for the explanation of the model are cooperation ($F = 63,97$; $R^2 = 0,676$), effects of team work ($F = 62,454$; $R^2 = 0,699$) and the quality of the relation ($F = 20,263$; $R^2 = 0,612$) values. Interestingly, the F-value for the entrepreneurial potential ($F = 4,896$; $R^2 = 0,469$) could prove that this variable is co-linear with another one. In this context, the assessment of the relationship indicates the quality of the relation ($r = 0,632$ - the highest of all variables) as a variable that can strengthen the significance of this potential. It can be presumed that the quality of the relation is a factor activating and developing the entrepreneurial potential in a team. It is therefore a synergistic factor that intensifies and strengthens the action of others.

Hence a positive influence of 4 variables describing teamwork quality on the satisfaction* value has been demonstrated using the non-standardised regression coefficient b . The cooperation ($b = 0,703$), effects of team work ($b = 0,617$) and the quality of the relation ($b = 0,465$) influence variability of satisfaction* in the greatest extend while the entrepreneurial potential ($b = 0,187$) has the weakest influence of the qualitative measurement of synergy. In the analysed model, the evaluation of the results of the standardised Beta regression coefficient (β)

confirms that also cooperation ($\beta = 0,508$) and the effects of team work ($\beta = 0,521$) are the best predictors validating satisfaction*. Therefore, given the analysed results, it becomes obvious that sense of progress (Amabil T.M., Kramer S.J., 2011) in teamwork, understood as achieving extraordinary effects in working together and achieving the level of excellence of joint action increases the chances of synergy in a team by increasing satisfaction*. In view of the above: The quality of joint action creates opportunities for synergy by providing the appropriate potential, level of relationship and stimulating cooperative activity can be considered a true hypothesis.

The next step in the quantitative analysis of data is the identification of compounds of variables constituting the basis for the description of factors strengthening the learning organisation undergoing a change. In the new approach the significance of the conditions for the occurrence of synergy in a team were taken into account, and the analysis area was expanded by two dimensions. After verification of the scales in the research tool, appropriate data segmentation was carried out, which allowed to identify 5 areas of analysis. As a result of the new data layout, the studied areas were defined with the following indicators:

- Activity in a joint action → described by two variables: cooperation - validated by the pursuit of common goals and course of cooperation and the effectiveness of a team.
- Improvement of learning organisation → described by two variables: the implementation of changes in an organisation - validated by the direction of changes in an organisation and behaviour towards change and team learning - validated by openness and flexibility in working together, as well as knowledge sharing.
- Social potential → validated by two interchangeable variables: entrepreneurial behaviour at work and a network of active relationships.
- Management → validated by two variables: managers support of joint-activity and strengthening and rewarding the team's activity.
- Satisfaction* → measured directly by 10 features describing mainly the sense of joint action meaningfulness, opportunities for potential development and awareness and value of progress in a team.

The carried out correlation analyses revealed the existence of statistically significant interdependencies. They occur between the 5 main conditions for the development of a learning organisation, described by: active participation, improvement of learning organisation, satisfaction*, social potential, management. The presentation of the results is presented in Figure 4.

Activity in team working	-				
Improvement of learning organisation	0,586	-			
Satisfaction*	0,611	0,753	-		
Social potential	0,441	0,447	0,44	-	
Managemet	0,249	0,475	0,415	0,504	-
N=200; p<0,001	Activity in team working	Improvement of learning organisation	Satisfaction*	Social potential	Managemet

Fig. 4. Pearson's correlation results of the learning organisation development

Source: own study.

The highest values of correlation coefficients were recorded in the case of satisfaction*, improvement of learning organisation and activity in team working. A qualitative measure of synergy in a team (satisfaction*) is the strongest relationship with improvement of a learning organisation ($r = 0,753$) and activity in a joint action ($r = 0,611$). The improvement of the organisation, in addition to satisfaction* is highly related with the activity in the joint action ($r = 0,586$). Thus we say about the mutual interdependence of three factors that are important for the development of any organisation. There was also a relatively high dependence between social potential and management ($r = 0,503$). This result indicates that a proactive management, providing an adequate support of entrepreneurial activities, building good relationships between people and strengthening and rewarding the team's activity, creates good development foundations of social potential. The quality of potential, used in building activity in a joint action, that is appropriately strengthened increases the possibilities of improving the learning organisation. This is especially important in conditions of innovative changes. The other investigated correlations are also statistically significant. The least significant dependence was demonstrated between activity in team working and management ($r = 0,249$). This proves that the way of management is not such an important variable that determines the quality of joint action. Probably there may be an intermediary variable in this relationship that will strengthen this relationship. It can be assumed, based on the results of the analysis, that the mediating variable in this system is the social potential, which shows quite significant relation with management ($r = 0,503$) and activity in a team working ($r = 0,441$). The distinction of the most important relations of factors validating the conditions for the development of an organisation is the basis of the next step in the quantitative analysis. Further activities are related to determining the value of factor loadings based on confirmatory factor analysis (CFA). The obtained results are presented in Figure 5.

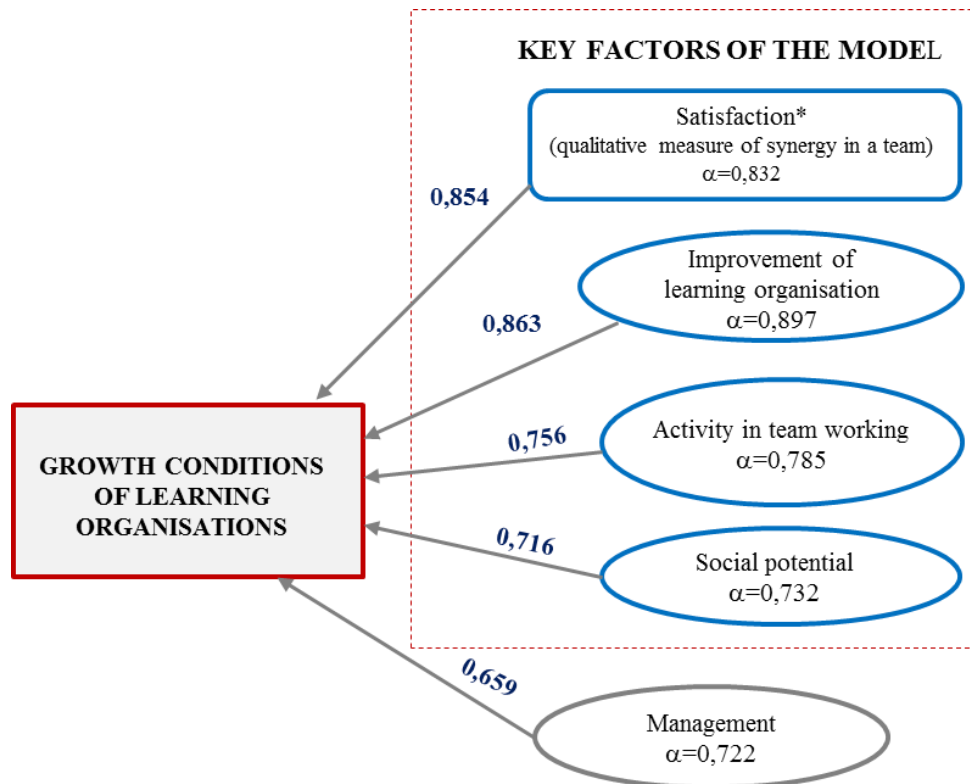


Fig. 5. Results of factor analysis (CFA) and assessment of Cronbach's alpha reliability factors validating development conditions of learning organisations

Source: own study.

The estimation of CFA model indicates a high value of factor loadings describing the development conditions of learning organisation. Four out of the five loadings obtained the desired 0,7 value, and the fifth had a similar one, thus individual variables typical for development conditions seem to make a good match.

Two variables: improvement of learning organisation (0,863) and satisfaction* (0,854) got the highest factor loading. At the same time, the quality of the analysis is clearly substantiated by high results of level of measurement's reliability, which was determined against the most significant values of loadings: improvement of learning organization $\alpha = 0,897$ and satisfaction* $\alpha = 0,832$. The second tier in the estimation of loadings was demonstrated for activity in a joint action (0,756; $\alpha = 0,785$) and social potential (0,716; $\alpha = 0,732$). The result, which represents the lowest value of all loadings, was also acceptable since it did not deviated greatly from the desired 0,7 value. This observation refers to the factor loading - management (0,659), whose internal coherence of the level of measurement is quite high $\alpha = 0,722$. CFA analysis generally points to a good fit of factor loadings, where the variables best validating the development conditions of a learning organisation are organisational improvement and satisfaction*. The results of the analysis are consistent with the analysis of the correlation coefficient and constitute a continuation point for data interpretation in the next area of the analysis.

The next stage of the quantitative approach when assessing the conditions of growth of a learning organisation is to present the values of the basic statistics, based on the data presented in Table 2.

Table 2. Characteristics of teams in individual and focus group interviews

Variables in the model	Average rating Arithmetical Average	Standard Deviation SD	Coefficient of variation V (%)
Satisfaction*	3,975	0,578	14,5
The activity in the joint action	3,861	0,379	9,82
Improvement of learning organisation	3,707	0,569	15,35
Potential social movements	3,681	0,431	11,71
Managing method	3,137	0,621	19,79
N = 200.			

Source: own study.

On average, the obtained parameters of individual variables indicate that their level can be assessed from quite low - management (3,14), to medium - social potential (3,68) and organisational improvement (3,71), and to rather high - activity in team working (3,86) and satisfaction* (3,97). With regard to the teams under examination, this result indicates a clear need to improve teamwork management, the managers therefore, are required to promote more the entrepreneurial activities and create more favourable climate for the development of social capital in teams, they are also to apply an appropriate rewarding system, which directly impacts the proactive behaviour, openness to change and knowledge sharing.

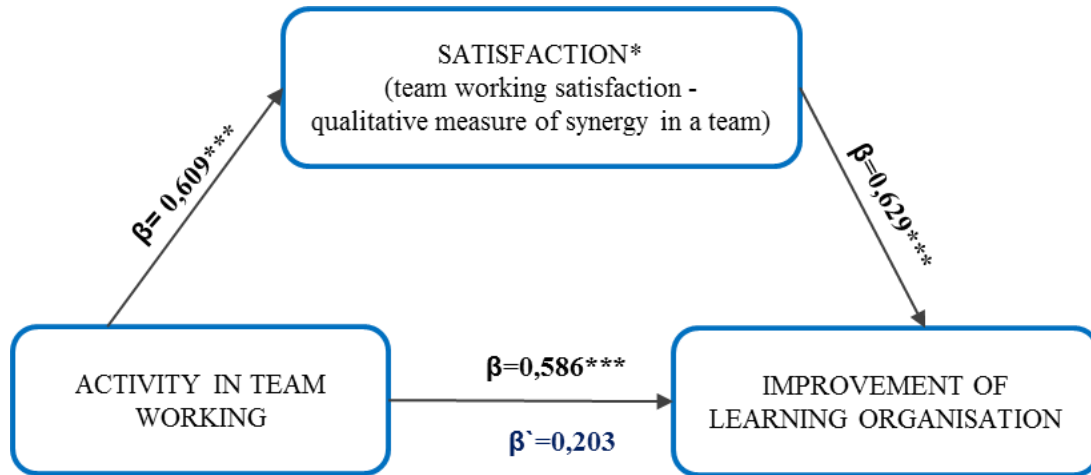
This direction of thinking and acting is the basis for team learning and increasing commitment in implementing innovative changes. The previous analyses have already showed that if the mechanism of enhancing the quality of teamwork, through a proactive management and properly developed and utilised social potential, works, the activity of joint action will increase. This effect, in turn, will translate into the openness and direction of organisation's improvement, and it will increase the level of satisfaction of joint action.

The analysis of data presented in table 2 takes into account the classical measurement of dispersion variance in form of standard deviation, as well as the assessment of the variation coefficient V. Based on this information, it is possible to indicate a small variability and diversity in relation to the answers provided. This is confirmed by the SD parameters in the context of the five variables studied, which range from 0,379 to 0,621. This result determines a fairly small standard deviation, i.e. indicates a small variation. In turn, the variation coefficient V defines the range of values from 9,82 to 19,7 and is the empirical evidence that the studied group is not very different in terms of the way of assessing the examined features. The analysis determines that the activity in team working shows the smallest variability and differentiation among all assessed features, and the way of management demonstrates the greatest. In the context of joint activity, there is a similar way of assessing factors that are important for ensuring the quality of teamwork. It was agreed that the most important is the course and organisation of cooperation and the effectiveness of team activities. Bearing in mind results of management, one should point out to a different way of interpreting the mechanism of influencing by the management team / team leaders. There may also be various expectations as to the method of support and rewards. The main observation is that the role of managers is to build an atmosphere of proactivity in order to stimulate the development of entrepreneurial potential and ensure the proper quality of the relationship.

Taking into account the results of the analyses presented in the article, the following information was obtained:

1. Pearson's r analysis of dependencies → satisfaction*, improvement of the learning organisation and activity in team working demonstrated the highest values of correlation coefficients. These variables show a strong co-dependence: satisfaction* - improvement of organisation ($r = 0,753$); satisfaction* - activity in team working ($r = 0,611$); improvement of organisation - activity in a joint action ($r = 0,586$).
2. Confirmatory factor analysis (CFA) → highest values of factor loadings were achieved by improvement of learning organisation (0,863), satisfaction* (0,854) and activity in team working (0,756) .
3. Analysis of the basic statistics (mean, SD and V-coefficient) → satisfaction* (3,97), activity in team working (3,86) and improvement of organisation (3,71) obtained the highest mean ratings. Activity in team working (SD = 0,379; V = 9,82), satisfaction* (SD = 0,578; V = 14,5), as well as improvement of the learning organisation (SD = 0,569; V = 15,35) shows one of the smaller values describing variability and differentiation.

The summary of the analysis determines the reasons for selecting the relevant variables, which are included in the next stage of the statistical data elaboration. The obtained empirical evidence is therefore a justification for the development of a mediation model based on multiple regression. The aim of the analysis of this model is to verify the assumption on the mediating role of the qualitative measure of synergy (satisfaction*) in the relations between the activity in the joint action and the direction of improvement in learning organisation. Therefore, a dependent variable - improvement of organisation, an independent variable - activity in a joint action and mediator - satisfaction* (a qualitative measure of synergy in a team) have been distinguished in the mediation model. Figure 6 shows the structure of the mediation triangle and obtained results.



Significance level *** $p < 0,001$

Fig. 6. Mediating model showing impact of activity in team working on improvement of an organisation, in which the qualitative manifestation of synergy in a team is the satisfaction* mediator

Source: own study.

The regression analysis in three subsequent steps (Baron R.M., Kenny D.A., 1986) explain whether the synergy, emerging in teamwork, strengthens the improvement of learning organisation:

1. Inspect if the relationship between the independent variable - activity in the joint action and the dependent variable - improvement of organisation is statistically significant (path C, figure 3).
2. Establish if the relationship between the independent variable - activity in a joint activity and mediator - satisfaction* (path A, figure 3) and the mediator and dependent variable - improvement of organisation (path B, figure 3) is statistically significant.
3. Analyse if after introducing the satisfaction* mediator into the model, the relationship between the independent variable - activity in a joint action and the dependent variable - improvement of organisation weakens (path C', Fig. 3).

The results of β coefficients obtained in the regression analysis resulting from the structure of mediation relationships are presented in Table 3.

Table 3. Regression coefficients of relations resulting from the structure of mediation dependencies - the independent variable (activity in a joint operation) - dependent variable (improvement of organisation)

Dependent variable - Improvement of learning organisation					
Model	Non-standardised coefficients		Standardised coefficients	t	Significance <i>p</i>
	<i>b</i>	Standard error	Beta (β)		
Absolute term	0,3177	0,3682		0,8628	0,3895
Activity in team working	0,8779	0,0950	0,5865	9,2461	0,000
Dependent variable - Satisfaction* (qualitative measure of synergy in a team)					
Model	Non-standardised coefficients		Standardised coefficients	t	Significance <i>p</i>
	<i>b</i>	Standard error	Beta (β)		
Absolute term	0,3983	0,3664		1,0870	0,2786
Activity in team working	0,9271	0,0945	0,6093	9,8107	0,0000
Dependent variable - Improvement of learning organization					
Model	Non-standardised coefficients		Standardised coefficients	t	Significance <i>p</i>
	<i>b</i>	Standard error	Beta (β)		
Absolute term	0,0713	0,2921		0,2440	0,8076
Activity in the joint action	0,3044	0,0947	0,2034	3,2159	0,0016
Satisfaction * (qualitative measure of synergy in the team)	0,6187	0,0622	0,6289	9,9450	0,0000

Source: own study.

Results of testing the mediation dependence (tab. 3) in the model (Figure 6) showed the following conclusions:

1. In the first regression equation, the direct dependence - activity in the joint operation and improvement of organisation was confirmed. The regression model proved to be well suited to the data and indicated that the higher the level of activity in the joint action, the better the organisation progresses towards innovative changes ($\beta = 0,586$, $p < 0,001$) (path C, figure 3).
2. The second step of the analysis, tested the relationship between the independent variable - activity in a joint action and the mediator - satisfaction* (path A, figure 3) and the mediator and dependent variable - the improvement of organisation (path B, fig. 3). These relationships proved to be statistically significant ($\beta = 0,609$; $p < 0,001$; $\beta = 0,629$; $p < 0,001$), and the models to be well-fitted to the data. This means that the second condition for the existence of mediation has been met.

3. In the mediating model that includes both the independent variable and the mediator (path C', Fig. 3), the role of activity in the joint operation decreased ($\beta = 0,203$; $p < 0,001$) but it maintained the level of statistical significance. The satisfaction* mediator was strongly associated with the improvement of organisation - the dependent variable ($\beta = 0,629$; $p < 0,001$). Therefore, it can be concluded that the introduction of synergy as a mediator changed the prediction of activity in a team work towards improvement of organisation. The analysis also indicates that satisfaction* - a qualitative measure of synergy is a predictor of improvement of the learning organisation under the conditions of change. Synergy strengthens team's learning, knowledge sharing, creativity, openness, flexibility towards change, and commitment to creating change. This favours the innovative development of teams and learning organisations.

The value of the Sobel test, for the b values and standard error introduced in the presented regression analyses (Table 3), turned out to be statistically significant ($Z = 5,435$; $p < 0,001$). This confirmed the mediating role of synergy (in terms of its qualitative measure - satisfaction*) in the impact of activity in team work on the improvement of organisation. Given the positive outcome of the analyses, the hypothesis can be positively considered: Synergy (measured by a qualitative measure - satisfaction*) as an increased effect emerging on the basis of high activity in a joint action strengthens the improvement of learning organisations in the area of innovative changes

Conclusion

The application of the grounded theory and the qualitative analysis of data allow to diagnose conditions conducive to the occurrence of synergy in a team. The research showed that well-arranged cooperation, measurable effects of joint action, high quality of relationships and a special type of satisfaction* (satisfaction of joint action) are stimulating synergy in team work. As the outcome of the study a synergy definition has been suggested. The definition describes the synergy as a phenomenon of an enhanced effect versus the result of individual factors. This is the kind of energy created in a team, which boosts the quality of working together. Synergy is the feature, it is the level of team-working excellence achieved by increasing activity stimulated by creative work of a team.

The research confirmed that activity in team working, the direction of improvement of organisation, and satisfaction* are the key factors stimulating development of learning organisations in conditions of a change. Moreover, it was also indicated that the management method and social potential are not the team's internal forces that could directly and independently create conditions for the emergence of synergy. Their role is to mutually strengthen actions when setting up an environment for team learning, sharing knowledge and demonstrating a proactive behaviour. In addition, during the analysis, an observation emerged that the quality of relationships in a team can be considered as a synergistic factor that stimulates other factors, e.g. the entrepreneurial potential, and generates an additional effect. Referring to the developed mediation model, it was indicated that the synergy expressed by the qualitative measure - satisfaction* has the status of a mediator in the relation of activity of joint action with the improvement of the learning organisation, therefore it is the development strength of learning organisations. The enhancing impact of synergy translates into creativity and the implementation of innovative changes. With all that in mind, one can assume that the concept of creating apt team working conditions that foster synergy boosts organisation's chances and a real-time opportunity to experience an innovative growth. The available papers on the aspect confirm the results of the developed analyses. Moreover, concepts that can be used for a fuller explanation, understanding and wider application in the modern organisation management are the theory of learning organisations (Sange P., 2014), knowledge (Earl M., 2001; Easterby-Smith M., Lyles M., 2003) and innovation (Ries E., 2011) management, and creative organisation (Florida R., 2014; Bilton C., Cummings S., 2010) or teams X (Ancona D., Bresman H., 2007).

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Monika JASIŃSKA PhD in politics, specialist in management and public administration. Currently, she works in the Department of Organisation and Management of the Faculty of Economics and Legal Sciences of Siedlce University of Natural Sciences and Humanities. She is a member of the Advisory Council of the Polish Agency for Enterprise Development Research Centre. She focuses on developing synergy in teams, researching learning organisations, growing social and human capital in organisations. She studies the development of entrepreneurship and innovation and building active conduct in organisations. At present her work deals with synergy in modern organisations. Her researches include innovation aspects, effective team working and knowledge management. She manages research projects, which are often conducted in cooperation with the industry to get the ultimate result i.e. improvement of organisation management.

ORCID ID: orcid.org/0000-0001-9231-4469

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FORMATION OF THE COMPETITIVE POTENTIAL OF THE AGRICULTURAL TERRITORIES

Marina Anokhina ¹, Rakhat Abdrakhmanov ², Yelena Evgenевна Gridneva ³, Milton Arrieta-López ⁴,
Nuray Romanovna Dzhaliilova ⁵, Abel Meza-Godoy ⁶

¹Plekhanov Russian University of Economics, 36 Stremyanny lane, Moscow, 117997, Russian Federation

²JSC «Narxoz University», 55 Zhandosov Street, Almaty, 050035, Kazakhstan

³Kainar Academy, 7a Satpayev Street, Almaty, 050013, Kazakhstan

^{4,6}Universidad de la Costa, Calle 58 # 55 – 66. Barranquilla, Colombia

⁵RUDN University, 6 Miklukho-Maklaya Street, Moscow, 117198, Russia

E-mails: ¹marina_anokhina@mail.ru; ²abdrakhmanov.rakhat@mail.ru; ³elengred@mail.ru; ⁴miltonarrieta@yahoo.com;
⁵agi1212@mail.ru; ⁶abelrmg@yahoo.es

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Abstract. The purpose of the study is to develop a mechanism for the formation of the competitive potential of the agricultural territories of Kazakhstan as the basis for ensuring the dynamic development of agricultural business in Kazakhstan. The research methodology is based on strategic alternative modeling for agricultural territories competitiveness management with the help of fuzzy cognitive logic. The study used a cognitive approach to decision making in the management of poorly structured systems proposed by V. Silov and actively developed in the works of modern scientists. Fifteen competent experts were invited to select the concepts and build a fuzzy cognitive map of the formation of the competitive potential of the agricultural territories of Kazakhstan. To carry out calculations and justify the content of the strategy, the authors used the software product “Intelligent generation of the best alternatives” (“IGLA”). The result of the study is the developed strategy for the management of agricultural territories competitiveness in Kazakhstan with a set of strategic goals and the best option for managerial impact, ensuring the formation of agricultural export potential of the region. The proposed version of the content of the strategy for managing the competitiveness of the agricultural territories of Kazakhstan can be used either as a system or as its separate elements in managing the development of agricultural business in the country and in developing strategic planning programs for the agro-industrial complex of the region. The novelty of the study in theoretical terms is justified by the approach to the formation of the country's agricultural export potential through ensuring the competitiveness of its agricultural territories. In methodological terms, the novelty of the study is expressed by the use of cognitive modeling technologies to develop a strategy for managing the competitiveness of Kazakhstan's agricultural territories, the implementation of which will allow achieving sustainable dynamics of agricultural production and increase the efficiency of the agricultural economy.

Keywords: agro-industrial complex; Kazakhstan; agricultural territories; competitive potential; cognitive modeling; fuzzy cognitive maps; static and dynamic analysis; strategic alternatives; competitiveness management strategy

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1. Introduction

Food independence issues remain relevant to any country. The current events in international relations make this issue more urgent and dictate the need to develop and implement a food security policy in Kazakhstan, taking into account the prevailing realities and potential of agricultural territories. It is the competitive potential of these territories that determines the ability of the state to provide itself with food resources. In Kazakhstan, more than 80% of the territories are agricultural. At the same time, a significant part of them is in a crisis state. The relevance of the problems of agricultural territory development is also confirmed by the growing number of scientific studies on this topic, namely the works of V. Bautin et al. (2004), L. Bondarenko (2015), I. Hitskov (2016), Guiomar et al. (2018). Studies on increasing the efficiency of using the resources involved in the agricultural production process are the main topic of research done by N. Nechaev (2016), M. Skalnoy (2018), Guth and Smędzik-Ambroży et al. (2019). The works of O. Ikonnikova (2014), A. Tarasova et al. (2016), N. Logantsova (2013), M. D'Amico et al. (2013), E. Andersen (2017), etc. are dedicated to the development of a comprehensive typologization of rural territories.

However, despite a significant amount of research on the development of agricultural territories, many theoretical and methodological issues related to the system for managing their competitive potential remain not fully understood and several points are debatable. The development of a justified support model and measures for the agrarian territories of a particular region, in particular, Kazakhstan, aimed at the formation and strengthening of their competitive potential, remains one of the most important issues.

The subject area of the research is the agro-industrial complex (AIC) of Kazakhstan. The subject of the study is the mechanism for the formation of the competitive potential of agricultural territories using cognitive modeling. The working hypothesis of the study is as follows. The competitiveness management of agrarian territories as a system includes the establishment of target priorities and a set of managerial influences in a specific time and content ratio, which ensures the dynamics of the development of agribusiness in the country and the formation of its agro-export potential.

2. Literature review: theoretical aspects of the competitiveness of agricultural territories

The possibility of applying the concept of competitiveness to a particular territory is currently disputed by many researchers. It is noted that in a market economy, the territory does not act as a subject of market relations and transfers the functions of the manufacturer to individual enterprises on a competitive basis. Therefore, having raw materials and investments, the territory cannot be subject to competition with these items of competition in the demand market. We find this point of view debatable. We believe that the competition of territories, including agricultural ones, is a natural competition for a profitable market for raw materials and sales of products, for mastering profitable logistics systems, for attracting human resources, for government subsidies in the highest amount, for effective communication channels, etc. For instance, South America as a regional territory has been linked for long with the export and production of a varied range of agricultural commodities, whether it is beef from Argentina and Uruguay, bananas from Ecuador or coffee from Colombia and Brazil. Trade data show that the region is indeed very competitive and important net exporter of agricultural commodities to the world, accounting for an estimated 16% of global food and agriculture exports between 2012 and 2015 (Duff and Padilla, 2015). According to the USDA, 31% of the 2017 world's oilseed production is harvested in Brazil and Argentina. (USDA, 2017). Behind the aggregate statistics for production and exports is an impressive list of commodities for which South America is the leading competitor and supplier to the world market.

Modern Kazakhstan is characterized by a high level of standardization not only of the economy but also of the entire sphere of public relations, which determines a significant dependence of the territory's competitiveness on the activities of state authorities. This problem is of particular relevance for agricultural territories, given that

agricultural production in Kazakhstan is the basic industry and the added value of the agricultural sector to the country's gross domestic product (GDP) according to the World Bank equals 4.2% (World Bank, 2019a).

The subjects of competition that are most susceptible to the influence of the authorities can include investments, labor and transport infrastructure. However, the competitive potential of a populated area is a multifactorial synthetic concept; therefore, the management of a particular competitiveness factor, as a rule, involves the impact on the totality of several interrelated factors.

Thus, a prerequisite for effective management of the competitiveness of the territory is a quantitative and qualitative assessment of the totality of its characteristics. Therefore, the determination of the competitive advantages of the territory involves the following sequence of actions:

- identification and analysis of the characteristics of the territory;
- detection of their change trends;
- assessment of the possible and optimal level of control action;
- determination of time and resource costs necessary to change these characteristics;
- comparison of the obtained results with the results for other territories similar to each other from the sectoral or geographical point of view.

In the sequence of managerial actions aimed at improving the competitiveness of the territory, the first place is occupied by the identification and analysis of its characteristics that are significant for the control action goal.

The variety of characteristics that affect the competitiveness of the territory requires careful classification. One of the most successful attempts at systematization was proposed by M. Khasanov and S. Yuldoshev (2001). The classification was developed by the authors to systematize factors affecting the investment attractiveness of the territory. However, as shown above, competitiveness is a more general concept compared to investment attractiveness, thus, this classification is also applicable to the factors determining the competitiveness of a territory. The factors are classified as follows:

- by the source of occurrence: external (global, national) and internal (regional);
- by dependence on the activities of people: objective and subjective;
- by components of investment attractiveness: investment potential and investment risk;
- by the action focus area: favorable and unfavorable;
- by the duration of exposure: long-term, medium-term, short-term;
- by the field of formation: economic, financial, sociocultural, legal, innovative, environmental;
- by predictability: predictable (expected) and unpredictable (unexpected);
- by the ability to be regulated: manageable (possible to regulate) and unmanageable (impossible to regulate);
- by way of expression: quantitative and qualitative;
- by importance: essential and non-essential;
- by the degree of intensity of changes: rapidly changing, moderately changing, slowly changing, almost unchanging.

To date, the classification of the characteristics of the territory proposed by A.G. Voronin (2007) has gained relatively wide popularity. The author identifies five main groups of characteristics:

- natural and climatic, as well as geographical;
- infrastructure and transport connections;
- existing structure of industry and business;
- demographic resource and professional level of the working-age population;
- administrative resource.

A combination of the three dichotomous classifications can be an alternative to the proposed model.

First, it is necessary to distinguish between natural and anthropogenic characteristics, which allows one to assess the initial potential of the territory and the level of its use. It must be borne in mind that natural characteristics can partially or completely change under the influence of anthropogenic impact; for example, a change in biocenosis as a result of deforestation.

Depending on the applied research objective, some parameters can be omitted, others, on the contrary, are detailed and refined. Therefore, second, it is necessary to separate the general and specific (or industry) characteristics, which allows one to limit the scope of the analyzed indicators depending on the intended focus area of the territory development. In this case, the determination and analysis of the characteristics must be carried out in two stages. At the first stage, more attention is given to the general characteristics, the analysis of which serves as a basis for the selection of the priority focus area. At the second stage, only characteristics related to a particular industry are considered.

The overwhelming majority of the characteristics proposed to illustrate the classification by origin belongs to the general characteristics group.

Specific (industry) characteristics of the agricultural territory are, first of all, the following:

- the landscape (with an assessment of suitability for a particular type of agriculture, such as crop production, cattle breeding in the context of cattle and small cattle);
- the minerals (significant for agriculture);
- the climatic parameters (duration of the frost-free period, the average temperature for the frost-free period, average annual rainfall, etc.);
- the soil composition and fertility;
- the hydrological regime and water resources (hydrographic network, excess/lack of moisture, seasonal fluctuations, the availability of sources to replenish the lack of moisture and the distance to them);
- the vegetation;
- the wildlife;
- the level of urbanization;
- the historical agricultural specialization, determined by climatic factors, as well as the ethnic and religious composition of the population;
- the proportion of the population employed in agriculture;
- the presence and level of development of agriculture and processing industry;
- the ratio of average productivity and processing capacities of the corresponding specialization (matching the market to the country's raw materials and processing capacities);
- the level of development of the social sphere in rural areas (the presence and accessibility of primary and secondary education institutions, primary health care, in the absence of rural areas, their remoteness and time spent to reach them are estimated);
- the condition of the road network;
- the presence of environmentally hazardous enterprises in this and adjacent territories and the level of their economic efficiency, as well as other sources of pollution that reduce the quality of agricultural products.

It is important to emphasize that all the lists of characteristics proposed above are not exhaustive. Each of them can be supplemented or changed depending on the objectives of the analysis. Indicators are analyzed in dynamics, except only those that do not change over time or change extremely slowly (for example, location, landscape, historical specialization, etc.).

Third, it is extremely important to differentiate unchanged and variable characteristics, which allows one to determine the necessary and possible amount of managerial impact depending on the goal and the chosen focus area of the territory development. This classification is the most significant one for assessing the possible effectiveness of territory development programs and investment projects. However, it is also the most difficult one for practical implementation.

The vast majority of characteristics are mutable or potentially mutable. In modern conditions, the variability of one or another parameter is almost always determined by the availability of appropriate resources. Two attempts to control climatic conditions can serve as an example of this. During the Soviet period, powerful greenhouse farms were established in many cities in the north of Russia that performed well in a planned economy but proved to be uncompetitive in market conditions. On the contrary, in Israel, where a significant part of the territory is located in an area unsuitable for agriculture, a highly efficient agricultural production has been created, the products of which are in demand not only in the domestic market but also in many other countries.

Thus, one should consider not only the feasibility but also the effectiveness of the proposed changes. The most expensive changes include the development of infrastructure and the creation of artificial climatic conditions. Finally, an average level of costs may be required to enrich the soil, provide tax benefits and preferences (in this case, the costs are related to the shortfall in budget revenues of the corresponding levels), develop a development strategy for the territory, increase the staffing potential of the territory, ensure the availability of health and education services, housing and quality utilities.

By the duration of obtaining the results of exposure, the following groups can be distinguished. In the shortest possible time (3-6 months), one can implement the changes that require only the adoption of relevant regulations (legislative guarantees of non-interference of the administration in business and the adoption of decisions on the provision of tax and other benefits and preferences). A longer period is needed for the management of changes that require not only normative consolidation but also the formation of sustainable practice for implementing the introduced norms (clarity and transparency of starting and running a business, development of financial instruments). Finally, the longest time will be required to increase the staffing potential, artificially change climatic conditions and develop the infrastructure of the territory (Zinchuk et al., 2018).

The above resource requirement is evaluative and in each case requires clarification depending on the territory and/or set of characteristics, for which it is advisable to use expert assessment methods. The payback period of the proposed changes is determined based on calculations.

Given the previously noted high level of standardization of modern Kazakh society, special attention should be paid to determining the level of change management. However, the changes are complex and dynamic, determined by a large number of interrelated factors. Therefore, the methodology for managing the competitiveness of agrarian territories as a poorly structured system should be based on a combination of formalized research methods and subjective models using expert judgment, common sense logic, intuition and heuristics. Such opportunities are provided by the cognitive approach to modeling the mechanism of formation of the competitive potential of agricultural territories.

3. Materials and methods: the methodology for agricultural territories competitiveness management using cognitive technologies

The issues of managing poorly structured systems using cognitive technologies are discussed in the works of such researchers as J. Casti (1982), R. Axelrod (1976), R. Atkin and J. Casti (1977), F. Roberts (1978), B. Kosko (1986), V. B. Silov (1995), V.I. Maximov (2001), Z. Avdeeva, et al. (2007) and others.

The methodology of cognitive modeling involves the construction of a fuzzy cognitive map (FCM), its static and dynamic analysis, the development of many alternatives that allow one to bring the state of the system to a given target value (level).

The algorithm and content of the stages of cognitive modeling of the processes of formation of the competitive potential of the agrarian territories of Kazakhstan were determined based on the developments of V. Silov (2005), V.I. Gorelova et al. (2012), D. Erokhina et al. (2010), N.K. Krioni et al. (2016), V.V. Kruglova (2002), A.A. Kulinich (2010), A.G. Podvesovsky et al. (2009), A.E. Kolodenkova (2017).

At the first stage of the study, we assessed the competitive potential of the AIC of Kazakhstan to determine the composition and content of concepts, in terms of which the competitiveness management system of the agricultural territories of the region is described. The low level of competitive potential of the agricultural territories of Kazakhstan is evidenced by the insufficient and unstable dynamics of the country's agricultural production (Figure 1) and the low level of the country's share in global food exports (Table 1). According to World Bank (2019b), the added value of agricultural output per employee, which is a measure of the efficiency of agricultural production, in Kazakhstan in 2018 amounted to \$6,912.68 (in 2010 prices). France surpassed Kazakhstan in this indicator by 9.09 times, the USA – by 11.44 times, Germany – by 5.38 times and Russia – by 2.29 times.

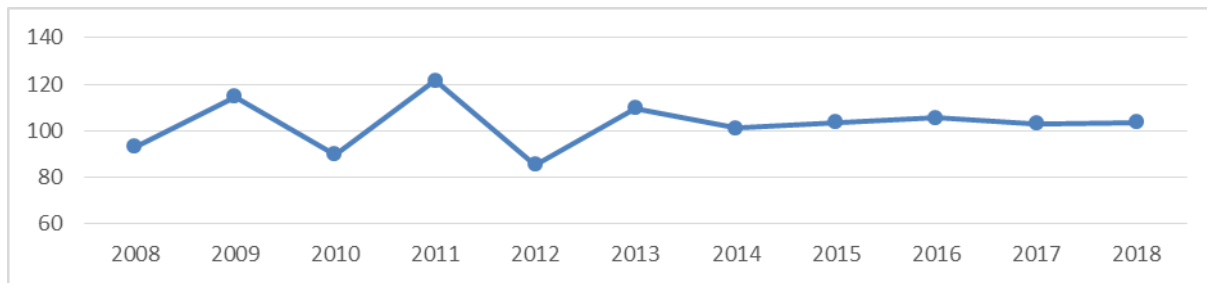


Fig. 1. Index of physical volume of gross agricultural products (services) of Kazakhstan, in % to the previous year

Table 1. Food exports, billion \$

Indicator	2012	2013	2014	2015	2016	2017
Global export	1,433.1	1,512.6	1,548.6	1,384.9	1,403.0	1,445.1
Export from Kazakhstan	2.94	2.76	2.62	2.14	2.2	2.45
Kazakhstan's share in global export, %	0.2	0.18	0.17	0.15	0.16	0.17

Source: ITC: <http://www.trademap.org>.

Experts were invited to determine the composition and content of the FCM concepts for the formation of the competitive potential of the agricultural territories of Kazakhstan.

The processing of expert data, taking into account analytical materials on assessing the competitiveness of the agricultural territories of the region, made it possible to substantiate seventeen concepts divided into four groups (Table 2). Generating competitiveness factors were defined as controlled concepts. Based on the results of this

stage, using the software product called “IGLA Decision Support System” (Podvesovsky et al., 2007), we obtained a cognitive matrix containing estimates of the intensity of influences.

A clear presentation of it was an FCM of the formation of the competitive potential of the agrarian territories of Kazakhstan (Figure 2). Kazakhstan, having significant land and labor resources for most types of food, does not provide the level of food consumption recommended by medical standards (Table 3).

The next stage of the study was a static analysis of the FCM, during which we calculated the main system indicators (Table 4). For this calculation, we used the mathematical apparatus presented in the works of V. Borisov et al. (2007), D.V. Erokhin et al. (2010), D.I. Kopeliovich et al. (2018).

Table 2. FCM Concepts of the formation of the agricultural territories competitive potential

Item No.	Concept name	Concept type	Initial level	Target level
Agricultural territory competitiveness indicators				
1	Agricultural production index	Target	Very low	Very high
2	Gross added value per person employed in agriculture	Target	Very low	High
3	Share in global food export	Target	Very low	High
Basic competitiveness factors of agricultural territories				
4	Milk production	Unmanageable	Low	-
5	Meat production	Unmanageable	Low	-
6	Gross harvest of staple crops	Unmanageable	Low	-
7	Gross agricultural output at comparable prices	Unmanageable	Low	-
Determining competitiveness factors of agricultural territories				
8	Yield capacity of staple crops	Unmanageable	Low	-
9	Productivity of cattle and poultry	Unmanageable	Low	-
10	Labor productivity index in agriculture	Unmanageable	Very low	-
11	Quality of agricultural products	Unmanageable	Very low	-
Generating competitiveness factors of agricultural territories				
12	Differentiation of rural and urban population	Manageable	Very high	-
13	Quality of life of the rural population	Manageable	Very low	-
14	Environmentalization of agricultural production	Manageable	Low	-
15	Scientific potential of the agricultural sector	Manageable	Very low	-
16	Technological potential of the agricultural sector	Manageable	Very low	-
External factor				
17	Natural and climatic conditions of agricultural production	Unmanageable, external	Very high	-

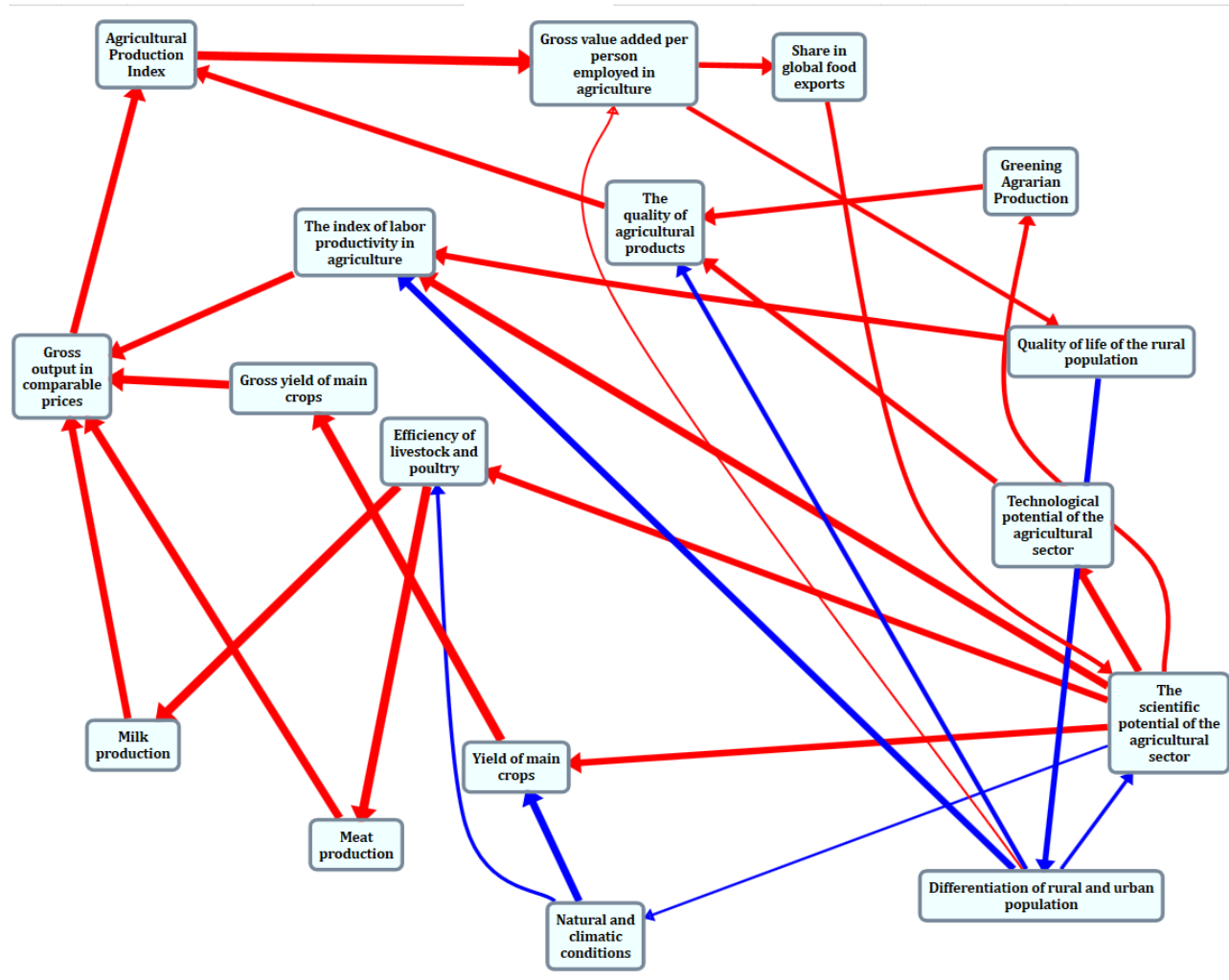


Fig. 2. FCM of the formation of the competitive potential of the agricultural territories of Kazakhstan

The obtained data allow us to verify the cognitive model as adequate to the real situation, as the consonance indicators that determine the quality of the logical sequence and the correspondence to experience are quite high (up to 0.7). It should be noted that the “scientific potential of the agrarian sector” concept affects the system of forming the competitive potential of agricultural territories of Kazakhstan to the greatest degree and the high level of the “differentiation of rural and urban population” concept limits the ability to increase competitiveness.

These concepts as manageable ones can affect the efficiency of the system and move it in a positive direction. The proposed system to a greater extent will contribute to increasing such target indicators as the “agricultural production index” and “gross added value per person employed in agriculture”. The strength of the system's influence on the “share in global food export” concept is less pronounced, which is probably due to the difficulty of increasing this parameter, given the internal and external conditions of AIC functioning in Kazakhstan.

Table 3. Level of satisfaction of the demand for food in Kazakhstan (kg per person per year)

Types of food	1990	1995	2000	2005	2010	2015	2017	Rational norm*	The level of achievement of the rational norm in 2017
Potatoes	86	70	65.7	47	47.5	48.5	48.6	100	48.6
Grain products	148	185	105.3	114	124.2	129.8	138.5	109	127.1
Sugar	38	18.5	21	16.4	38.1	41.9	46.3	33	140.3
Meat and meat products	73	52	44.4	40	65.9	73.6	77.9	78.4	99.3
Eggs (pcs)	225	97	102	108	150	164	193.3	265	72.9
Oil	11.2	7.6	8.9	9.7	18.8	19.3	19.2	12	160.0
Vegetables	76	56	85.5	71	87.6	90.2	94.1	149	63.2
Fruit and berries	23	11	14.7	36	58.5	64.4	74.9	132	56.7
Milk and dairy products	311	229	234.6	189	227.6	233.6	261.3	301	86.8

Source: Ministry of National Economy of the Republic of Kazakhstan. Committee on Statistics. Statistics on agriculture, forestry, hunting and fisheries <http://adilet.zan.kz/rus/docs/V1600014674>

Order of the Minister of National Economy of the Republic of Kazakhstan dated December 9, 2016 No. 503 registered in the Ministry of Justice of the Republic of Kazakhstan on January 13, 2017 No. 14674 “On the approval of scientifically based physiological norms of food consumption” <http://adilet.zan.kz/rus/docs/V1600014674>

*Order of the Minister of National Economy of the Republic of Kazakhstan dated December 9, 2016 No. 503 registered in the Ministry of Justice of the Republic of Kazakhstan on January 13, 2017 No. 14674 “On the approval of scientifically based physiological norms of food consumption” <http://adilet.zan.kz/rus/docs/V1600014674>

The dynamic analysis of the FCM in this study represents a stage, during which strategic alternatives are developed for the formation of the competitive potential of agricultural territories and the choice of a variant of strategic actions leading the system to a given target state is made. The methodological basis and the mathematical apparatus of impulse processes for predicting the behavior of a system under various variants of the influence of controlled concepts are described in the works of A. Podvesovsky et al. (2009), R.A Isaev and A.G. Podvesovskii (2017). The model time is discrete and is represented by a dimensionless scale of values from 0 to N. It is possible to allow some correspondence between the scales of the model and physical time. The value of N is determined either by the achievement of a given moment of discrete time or by the achievement of some stable situation.

During the dynamic analysis, 242 strategic alternatives for the formation of the competitive potential of the agricultural territories of Kazakhstan were generated, of which 18 were not dominated. A visual analysis of these alternatives according to the criteria of the level and sustainability of the achievement of the target concepts, the magnitude of the power of control actions made it possible to unambiguously identify Alternative 146 as the best of them.

4. Results: the mechanism for the formation of competitive potential of agricultural territories of Kazakhstan

The result of the study was the selected and justified strategic alternative to the formation of the competitive potential of the agrarian territories of Kazakhstan, described in terms of the methodology of cognitive modeling (below in Table 5).

Table 4. FCM system indicators of the formation of the competitive potential of the agricultural territories of Kazakhstan

No.	Concepts	The consonance of the concept's influence on the system	The consonance of the influence of the system on the concept	The dissonance of the concept's influence on the system	The dissonance of the influence of the system on the concept	The influence of the concept on the system	The influence of the system on the concept
1	Agricultural production index	0.9057	0.9665	0.0943	0.0335	0.1817	0.3105
2	Gross added value per person employed in agriculture	0.8734	0.7945	0.1266	0.2055	0.1611	0.3087
3	Share in global food export	0.9718	0.8268	0.0282	0.1732	0.1940	0.1988
4	Milk production	0.9156	0.9079	0.0844	0.0921	0.1517	0.1199
5	Meat production	0.9156	0.9079	0.0844	0.0921	0.1626	0.1199
6	Gross harvest of staple crops	0.9156	0.9082	0.0844	0.0918	0.1734	0.1022
7	Gross agricultural output at comparable prices	0.9106	0.9467	0.0894	0.0533	0.1641	0.2961
8	Yield capacity of staple crops	0.9207	0.9030	0.0793	0.0970	0.1941	0.0653
9	Productivity of cattle and poultry	0.9259	0.9027	0.0741	0.0973	0.2321	0.0859
10	Labor productivity index in agriculture	0.9156	0.9121	0.0844	0.0879	0.1409	0.1522
11	Quality of agricultural products	0.9106	0.9262	0.0894	0.0738	0.1406	0.1196
12	Differentiation of rural and urban population	0.6277	0.8591	0.3723	0.1409	-0.2329	-0.1184
13	Quality of life of the rural population	0.7276	0.8268	0.2724	0.1732	0.1388	0.1626
14	Environmentalization of agricultural production	0.9158	0.8979	0.0842	0.1021	0.1079	0.0718
15	Scientific potential of the agricultural sector	0.9666	0.8927	0.0334	0.1073	0.3766	0.1050
16	Technological potential of the agricultural sector	0.9158	0.8979	0.0842	0.1021	0.1079	0.1117
17	Natural and climatic conditions of agricultural production	0.9403	0.8979	0.0597	0.1021	-0.2227	-0.0399

Table 5. The content of the best strategic alternative (Alternative 146) of the formation of the competitive potential of the agricultural territories of Kazakhstan

Name of the concept	Description of the dynamics of the concept
Target concepts	
Agricultural production index	In the first two steps, the concept does not change and remains at a “very low” level. From step 3, a sharp increase is achieved to a value of “very high” (by 6 levels), which corresponds to the target value of the concept.
Gross added value per person employed in agriculture	In the first three steps, the concept has negative dynamics and remains at a “very low” level. From steps 3 to 7, a sharp increase to the “high” value (by 5 levels) is ensured, which corresponds to the target value of the concept.
Share in global food export	In the first four steps, the concept is reduced to “very low”. From step 4 to step 8, we expect a sharp increase in the concept by 5 levels and achievement of the established target “high” value.
Manageable concepts	
Differentiation of rural and urban population	In the first two steps, the value needs to be reduced by 6 levels and ensure a stable “very low” concept value in subsequent steps.
Quality of life of the rural population	From step 1, the concept needs to be increased by 5 levels to a “high” value, from step 6, increased by another 1 level and remain stable at this value.
Environmentalization of agricultural production	For the first 3 steps, the concept should be increased by 4 levels, from step 4, the stability of the concept value needs to be ensured at a “very high” level.
Scientific potential of the agricultural sector	For the first 6 steps, the concept by 3 levels needs to be increased to the “average” value. From steps 6 to step 9, it needs to be brought to the “very high” value (raise another 3 levels) and remain stable.
Technological potential of the agricultural sector	At the first 3 steps, a “very high” value needs to be achieved and its stability needs to be ensured at this level.

To implement this strategy, taking into account its content, we identified the following strategic initiatives that ensure its implementation:

1. Formation of a competitive scientific and technological base for agricultural production.

It is impossible to increase the competitiveness of agricultural territories without large-scale modernization of production, as well as the introduction of advanced technologies and modern information support. The scientific and technological base of the AIC, focused on the use of technologies of spot agriculture, organic and soil-saving agrarian production, accelerated selection and seed production, deep processing of agricultural raw materials, biotechnologies, etc. is capable of creating the basis for high-tech and competitive agricultural production as a system-forming complex of agricultural territories. In the context of the implementation of the strategic focus on the formation of a competitive scientific and technological base, it is necessary to solve the problem of the connection between scientific research and agricultural production. Transfer of research results requires a developed organizational mechanism with appropriate structures in the form of science cities, technology parks, clusters, scientific and technological platforms.

2. Development of academic and professional human resources of the agricultural sector.

The solution to this problem is possible through the creation of an effective scientific and educational complex of the industry, which ensures the introduction of modern scientific achievements in agricultural production as the most important condition for increasing the competitiveness of agricultural territories. The main focus areas of improving the system of agricultural education should be the following: the formation of a multi-level innovative educational environment in the agricultural sector, the development of a mechanism for the interaction of

educational structures and business, the creation of modern research areas and schools, the implementation of a system of measures for the development of new forms of combining agricultural science and education.

3. The formation of social conditions for increasing the competitiveness of agricultural territories.

This strategic initiative is one of the most difficult in terms of its implementation, as it affects changes in the public assessment of the place and role of agriculture in the life of the nation. Therefore, one should start by building the economic foundations of such changes. First of all, it is the creation of material living conditions in rural areas under social standards, raising the level of remuneration following the general economy, the implementation of infrastructure projects following current program documents and in full. In the long term, the strategic initiative for the social development of agricultural territories should be focused on the priority development of agriculture as the root system of human society, which forms powerful incentives for general progress in the national economy, which requires a change in public consciousness in relation to agricultural labor and an increase in its attractiveness.

4. Development of an economic mechanism for managing the competitiveness of agricultural territories.

As part of this initiative, it is necessary to overcome the high differentiation of agricultural producers in terms of profitability and the ability to carry out innovative development. A level of profitability and profit of agriculture sufficient for expanded reproduction, investment, the scientific and technical progress should be ensured.

5. Formation of a system for the distribution of production and the territorial-sectoral division of labor in the agricultural sector.

The bioclimatic potential of the agricultural territory is one of the most important conditions for its competitiveness. Of course, a general strategy for the spatial development of the country and a general layout for the distribution of agricultural production are needed. These documents should become the organizational and regulatory basis for the rational distribution of agricultural production in each specific agricultural territory. The agro-industrial production-distribution system will enhance the competitiveness of not only territories with relatively favorable environmental and economic conditions for intensive and high-tech agro-industrial production, but also stimulate the development of problem areas.

6. Development of the structure of the agricultural industry.

The structural factor of increasing the competitiveness of agrarian territories should be realized first of all through the transformation of the organizational and legal forms of production in the direction of achieving a rational ratio between large, medium and small forms of management. The process of improving the structure of the industry must be carried out to create equal competitive conditions and unify access to state support for business entities of various kinds operating in a specific agricultural territory. It is necessary to promote the massive development of small and medium-sized enterprises, their cooperation and contracting with large business, gradually transforming cooperative forms into one of the leading sectors of food production in agricultural territories. The formation of the competitive potential of agrarian territories will be facilitated by such organizational forms of management as sectoral and functional unions, agrarian clusters, strategic alliances and other partner associations.

7. Integration of agricultural production of agricultural territory into the international division of labor.

Practice shows that the presence on the agricultural territory of an integrated formation with the participation of foreign counterparties contributes to its economic and social stabilization. Integrated international structures are

attractive for investors; they allow avoiding the aggravation of social problems and can maintain a certain price level in the market.

The creation and functioning of an integrated international formation on a specific agricultural territory contribute to its development, increases the employment of labor resources and provides for the modernization and updating of the material and technical base of the infrastructure. Such structures also introduce a new production culture, which is primarily focused on large-scale production. This has a positive effect on both the economic and social components of the activities of participating enterprises.

The development of economic integration in agriculture of the agricultural territories of Kazakhstan is currently associated with the country's participation in the Eurasian Economic Union and the CIS, the Shanghai Cooperation Organization, BRICS, APEC. To increase the competitiveness of agricultural territories by their climatic, territorial, organizational and economic characteristics, using the variety of relations between the states of these organizations, it is advisable to develop mechanisms for mutual trade, attracting investments, and implementing joint developments in the field of technical and technological agricultural innovations. This form of cooperation will help to create the competitive potential of agricultural territories due to the development of the export component, accelerate the modernization of agricultural production and increase its productivity, ensure adaptation of agriculture to climate change and innovative activity of economic entities.

5. Discussion

The developed strategy for the formation of the competitive potential of the agrarian territories of Kazakhstan requires considerable efforts in achieving, first of all, manageable parameters. It is necessary to weaken the concept of “differentiation of the rural and urban population” by 6 levels from step 2, to increase the concept of “quality of life of the rural population” by 6 levels from step 2, to ensure a “very high” value of the concept of “greening agricultural production and products” from step 4, in almost 9 steps to form the scientific potential of the industry, bring to the “very high” value from step 3 the concept “technological potential of the agricultural sector”. In modern management practices of the AIC of Kazakhstan, to ensure such a significant change in its condition is a very difficult problem. Therefore, using impulse modeling, it is advisable to develop a version of the strategy based on the best Alternative, taking into account the possibilities and suggesting a phased change of individual managed concepts. Adjusting the content strategy, determining combinations of the influence of managed concepts, determining a set of actions in time requires additional research and can be considered as its continuation. However, at this stage, the results obtained are of practical importance in terms of identifying priorities and a combination of factors that shape the competitive potential of Kazakhstan's agricultural territories.

Conclusion

The results of the study confirm the scientific hypothesis about the impact of the competitiveness of agricultural territories on the development of the country's agro-industrial production and the formation of its agro-export potential. On the example of the AIC of Kazakhstan, we justified the feasibility of implementing a mechanism for the formation of the competitive potential of agricultural territories, developed with the help of cognitive technologies. Thus, we can state the achievement of the research goal.

The proposed concept of researching the field of managing the competitiveness of agricultural territories is based on the algorithm of cognitive analysis of a difficult situation. The results obtained made it possible to determine the parametric content of the mechanism for the formation of the competitive potential of the agrarian territories of Kazakhstan, to generate and analyze, using impulse modeling, the country's AIC development strategy to achieve the established competitiveness targets “agricultural production index”, “gross added value per person employed in agriculture”, “share in global food export”.

The areas of further research in terms of adjusting the developed strategy are determined to take into account the existing internal capabilities of the country, as well as limitations and challenges from the external environment.

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Marina Y. ANOKHINA

ORCID ID: orcid.org/0000-0003-4152-8795

Rakhat ABDRAKHMANOV

ORCID ID: orcid.org/0000-0002-7397-6165

Yelena Evgenevna GRIDNEVA

ORCID ID: orcid.org/0000-0002-3279-2036

Milton ARRIETA-LÓPEZ

ORCID ID: orcid.org/0000-0002-3437-5025

Nuray Romanovna DZHALILOVA

ORCID ID: orcid.org/0000-0003-3034-6398

Abel MEZA-GODOY

ORCID ID: orcid.org/0000-0002-4347-6143

Register for an ORCID ID:

<https://orcid.org/register>

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JOB CRAFTING IN INDIVIDUALISATION FIELDS OF COMPANY HUMAN RESOURCES*

Jaroslav Stanislaw Kardas

Siedlce University of Natural Sciences and Humanities, Faculty of Economic and Legal Science, 2 Konarskiego, 08-110 Siedlce, Poland

E-mails: jaroslav.kardas@uph.edu.pl; kardas@kardas.pl

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Abstract. The subject of the research is individualization fields of HR policy, including Job Crafting, in the opinion of working and nonworking students. The aim of the article is to identify individualization fields of staff management and the attitude of survey respondents towards Job Crafting. To this end, the author has conducted a discussion and a diagnostic survey, critically analysing literature. The starting point is to define individualization fields: a form and period of employment, working hours, workplace, job responsibilities, work process, professional development, forms of remuneration and social benefits. In each of the above fields the possibility of Job Crafting use is discussed. The research shows that the present and future employees want to engage in the design of their work using Job Crafting. They declare such willingness in many individualisation fields. It has been found that Job Crafting used during the induction of new recruits brings more benefits because at this stage they shape their opinions about work, employers, employees, management, and relationship in the company; at this stage the recruits often come up with innovative solutions. Redesigning even a small element in an individualization field creates an important and positive impact on their approach to work.

Keywords: human resources; Job Crafting; adaptation; competences; individualization

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1. Introduction

Present-day society seems to be in constant motion, with private and professional life constantly changing. Assumptions common a dozen or even a few years ago are not relevant to what it is experienced today in personal or professional development. Everything is changing with growing personal age, and things like appearance or reality perception evolve together with different taste, sense of smell, reception of stimuli, but also with professional aspirations and objectives. Present pursuits are not the same as those in the past, with choices made according to knowledge, skills and attitudes, constantly acquired and developed. Thus, it is obvious and inevitable that everything around, together with people and their environment, is undergoing continuous change. Therefore, it is very difficult, from the point of view of an entrepreneur, to adjust staff policy standards to the needs of employees, who changing with age do not stop progressing professionally following their experience and skills. Of course there are companies that have mastered the processes of adapting workplaces to meet the staff's demands quite well, for example, helping those with physical or mental disabilities, which is confirmed by the results of the studies carried out within the framework of "Ergo Work project – Joining academia and business for new opportunities in creating ERGOnomic WORK places" Programme: Lifelong Learning Programme, Erasmus (Project no.: 539892-LLP-1-2013-1-SI-ERASMUS-EKA, Grant Agreement no.: 2013-3750/001-001); the author of the present paper was a co-author of the Partner 4 programme. As is apparent from the above project, some workplaces are changing along with other processes, responding to the needs of disabled workers, while at the same time social dialogue on working conditions develops (Kardas & Wójcik-Augustyniak, 2015). It has been also found in those studies that in the context of working teams with, for example, different cultural background, there is a stronger preference to work in a multicultural environment at the initial stages of the adaptation process. However, during later stages there is some inclination to work in a team of the same culture (Stankiewicz & Ziemiański, 2018, p. 216-228).

In terms of their business activities companies follow their individual preferences in HR policy, actively using feedback from staff and management. Enriching the workplace environment with positive attitudes and solutions they consistently improve working conditions, increasing staff's job satisfaction. This strategy strengthens the use of labour potential and generates an additional energy for company performance. It can be concluded that companies apply what is called Job Crafting, engaging in activities focused on improving the quality of the environment and working conditions. For the first time Job Crafting was described and studied by Amy Wrzesniewski and Jane E. Dutton (Wrzesniewski & Dutton, 2001, p. 179-201).

Job Crafting is directed at making adjustments in the workplace to make it more satisfactory for the employee. In other words it means overcoming the limits of work (listed in job description) to make the job closer to the employee so that it becomes more exciting, consistent with the company strategy and in accordance with individual potentials (Berg and Dutton & Wrzesniewski, 2013, pp. 81-104). To put it differently, it is based on an effort to change working conditions so that the staff can enjoy what they do. Therefore, in the individualization fields of Human Resources policy it is important for the management and staff to establish planning rules to create dedication to work processes known as Job Crafting. Dedication here means matching one's work and professional activity to personal and professional abilities and development. In this case, the cooperation between supervisors and employees is crucial. Such cooperation translates into an increase in loyalty of employees, and this in turn has a big impact on steady efficiency of their work and on long-term financial situation of the company. This process starts from the moment of the new recruit induction, but the effects of Job Crafting is obtained at the time of full satisfaction of all other employees.

The biggest challenge to the management is creating and then preserving the workers' satisfaction, and for this purpose it is necessary to individualize human resource policy. Taking this into account, the purpose of this article is to identify individualization fields of Human Resource policy and to study the attitude of the respondents to Job Crafting in each of the fields.

2. A literature review on Job Crafting

In the implementation of Job Crafting what is necessary first of all is competences. In literature the term 'competence' is variously defined because of different interpretation by different scientific disciplines. The results is that it should be looked at as a construct, and it should be accepted that there is no single and best competence model (Walkowiak, 2008, p. 143). Denoting integrated use of abilities, personality traits, acquired knowledge, and skills, as well as typical behaviour and procedures the term 'professional competence' when translated into action brings about successful execution of complex tasks within the framework of the company expecting all the above from a worker in the spirit of its strategy and its culture (Levy-Leboyer, 1997, p. 19). Understanding and interpreting the term 'competence' and 'competence profiles and groups' are dealt with more broadly by such authors as S. Whiddett and S. Hollyforde (2003, pp. 11-36), G. Filipowicz (2004, pp. 17-45), R. Wood and T. Payne (2006, pp. 32-45), and T. Oleksyn (2006, pp. 17-97).

The measure of a success of an entity's competence is its efficient management. Well organized work should take into account four basic elements: (1) awareness of real objectives, (2) planning, (3) acquisition and allocation of resources, (4) control based on comparing action results with accepted patterns and on conclusions for the future drawn from such comparisons. It seems that well organised work giving employees a significant role is in itself a fulfilment of Job Crafting. Thus, the idea of Job Crafting is to give employees satisfaction from work by increasing their involvement (Wrzesniewski & Dutton, 2001, pp. 179-201).

In the process of Job Crafting there is a comprehensive thinking about work, treating it as a process consisting of many tangible and intangible components. Those components are activities aimed at the individual adaptation of work to abilities and aptitudes of workers. Those abilities and aptitudes allow for proper relationships with the work environment, leading to a belief that one is responsible not only for oneself, but also for other co-participants. Each employee, and especially the manager should be aware of such liability, but the latter has more control over the quality of mutual relationship than the former (Atwater & Dionne, 2007, pp. 183-208). In the above view, the question is how to identify staff's and recruits' competences so that Job Crafting can be introduced into the company in a responsible manner.

Competences of staff and recruits can be assessed at work and in particular in the process of selecting company future employees, particularly during recruitment and induction. Identification of competences can be done based on experimental methods, diagnostic surveys, statistical comparisons, studies of focus groups, and analyses. What is determined then is a recruit's personality features, abilities, interests, work experience, and achievements. At the same time such assessment allows identifying company needs and competence gaps. Then, it is necessary to establish individualization fields of HR policy and to use them efficiently.

For the development of competences employees and recruits should have motivation to be followed in their future work. This motivation is a necessary condition for self-development, creating positive self-image at work, and proper relationship with others (Baumeister & Leary, 1995, pp. 497-529).

Company staff with high competences but low motivation do not reach success, not being able to effectively design their work. Therefore, in creating a job profile consistent with Job Crafting objectives what needs identifying first is the characteristics and conditions that make a highly competent employee, motivated and full of energy to work. To this end methods of new recruit adaptation should be adjusted. Adaptation should be carried out in cooperation with new employees in order to include them in company work processes speedily and without conflicts. The role of the leader-superior associated with an effort to match the person to the team begins at the stage of the recruitment process when there is a review of the recruit's compatibility in terms of values, standards, goals, or the specificity of professional functioning (Wojtczuk-Turek, 2018, p. 30).

The most common adaptation process of a recruited person is divided into three stages. Stage one includes induction interviews in the company's HR department. Already at this point the process of the recruit's induction starts. In the department they receive information on the nature of work which they possibly will perform, paying conditions, extra benefits, and necessary documents which they should be familiar with.

According to Job Crafting it is important that the recruit should have a chance to take part in the conversation, being able to provide their views without time limit and to ask and answer questions freely, without being ignored. It is important that the new recruit should feel a sense of being in a harmonious competent team of employees aware of the value of corporate culture. It is also necessary to indicate possibilities of influencing the culture, as well as its design; it should not be a closed system.

The next step of the first stage is meeting the future manager, who informs the recruit about work details, requirements, team of associates, development possibilities, and financial perspective. In addition, the manager shows the new employee around the company, responding to questions and inquiring about qualifications and professional experience mainly; the supervisor must ensure that the new recruit meets the expectations. After the conclusion of the initial contract, the new recruit returns to HR with an application for steady employment.

In general, stage one with its interviews is when the future employee has an opportunity to examine the level of openness of the superiors to the recruit's designing his or her own work. Consequently, at this stage the recruit may decide to take the job in a company organized this way, or to give it up. If all data obtained at this stage proves that the recruit may like the job, he or she should take a decision to go on to the second stage of adaptation. Stage two includes admission to the workplace and initial adaptation. In this stage, the future employee receives recruitment forms to be filled in, medical examination referral, and usually the initial training takes place, which should be confirmed on paper. The filled-in forms are returned to the Human Resources, and the recruit signs an employment contract, usually for a trial period. The procedure during this stage is of a bureaucratic kind, and it does not give the recruit any chance to influence the recruitment process. Thus, it seems that during this process Job Crafting cannot be implemented because all those activities must run on schedule. According to this schedule, after the signing of the employment contract, new recruits go to the head of the unit in which they will be working. From the head they receive detailed information. At this stage, they have an opportunity to influence the course of the procedure, suggesting some minor changes, asking for information about aspects that might bother them or they do not know enough about. Following the presentation of the company and explanation of some doubts new employees receive a mentor, an experienced person with high authority, who will introduce them into the company work processes. At this stage, under observation and advice of the mentor, new employees have an opportunity to think about what their initial attitude to those processes is, whether they are open to new ideas, and how they could arrange the time and energy to carry them out, or whether they find any new and exciting elements in the new job. This adaptation stage is the time to present their own concepts to organize and execute the work better; this individualization field is quite broad.

The third stage of the employment cycle is long-term adaptation. It means introducing them to the job and to the team with whom they will work. The role of this stage is firstly to enable new employees to be part of the business community so that they can participate in a well-functioning system. Secondly, the employer draws conclusions of the recruits' opinion on the nature of work processes, their organisation, and on the job itself, its possible advantages and disadvantages.

By analyzing literature, survey results (the studies of 2018, N = 152, research methodology is described later in this article), and the author's experience, it seems that proof of success of the above mentioned adaptation stages is a clearly defined job profile. It appears that the four most important elements of the profile are as follows: (1) employees should have a required level of intelligence, energy to work, awareness of the consequences of their

decisions in which crystallized expectations play a crucial role, confidence, an accurate assessment of the situation, an emotional self-awareness, and flexibility to changes, (2) potential workers should develop their knowledge, skills and attitudes, but they should be aware of a large role of fitness predisposition, including health, (3) employees should be aware of their strengths and weaknesses and should control their changes, and (4) employees should have skills to gain experience and use it in practice to deal with work challenges, learning not only from their mistakes but also from theoretical analysis observing facts, making conjectures, and accumulating knowledge. Both ways of action, i.e. experience and analysis, allow employees to adjust their competences. Consequently, competence level in the learning process increases, and the company performance increases too.

An indispensable element of new employee adaptive processes is uncertainty resulting from challenges in the company environment and inside it. Company performance and effectiveness depend on the proper way to diagnose those challenges and on a quick response to them. Therefore, understanding the needs and expectations of employees and their readiness to participate in dealing with challenges the company faces can be very important for its performance.

It should be noted that in the adaptation stage the primary function of the management, as mentioned earlier, is to explain the nature of work to the recruit, discussing important elements and various aspects of the job. An explanation deals with all those aspects, together with duties and responsibilities, and what the recruit's position in relation to other employees is (employment status). This way, employees' awareness of their place in the company can be used to facilitate synergy of efforts, which translates to Job Crafting. However, companies do not always appreciate the role of such a procedure and are not always aware of its impact on economic performance (Martyniak, 1997, p. 11). The role of such a procedure is not appreciated enough despite the fact that companies declare being familiar with the essence of the adaptation process. For the record, its essence is to provide recruits with behavioural patterns that will be required from them in the future (Marciniak, 1999, p.83).

Thanks to flexible adaptation processes, in which new recruits can design their work and professional relationships according to their needs, the company can operate more efficiently, for its own and employees' benefit. Among many benefits of Job Crafting during adaptation processes the five most important are: (1) a significant reduction in staff turnover related to the lack of required suitability, (2) an increase in work efficiency and improvement of its quality in a shorter period of time than in classic forced adaptation that lacked cooperation, (3) an increase in work satisfaction and in the level of employee-employee and employee-company integration, substantially reducing stress associated with the new job, (4) the shaping of employees' positive attitudes and sense of belonging to the community, proper identification of their aspirations, and quick adaptation to corporate culture, (5) quick identification of skills, creativity, and other potentials of employees.

3. Methods

To implement the objectives presented in the introduction to this article, i.e. identification of individualization fields and identification of employees' attitude to Job Crafting in each of those fields, the following tools are applied: critical review of literature and diagnostic research including surveys and discussions. The area of interest is located in the three stages of company recruit induction: an induction interview, admission to work with preliminary adaptation, and long-term adaptation. In each of the stages possibilities of Job Crafting are outlined.

Surveys in the form of discussions were carried out in October 2018 on a group of 152 Polish students in the Mazovian Voivodeship. Among surveyed respondents there were 71 working students (including 40 men and 31 women) and 81 nonworking students (including 31 men and 50 women). The selection of the sample was random. Within the framework of the research there were group discussions and individual interviews, depending on the participants' background: working or nonworking students.

4. Individualization fields in company HR policy and in work organization

Individualization fields are selected by analysing literature and discussions carried out within the framework of the studies conducted in 2018 (N = 152), and by drawing conclusions from the author's experience. Those individualization fields should be implemented in company human resources policy as early as during the induction of new recruits. Individualization fields of HR policy and work organisation are presented in Table 1.

Table 1. Individualization fields of staff policy and the organization of work

Action category	Action area and framework	Action implementation
The form of contract	Freedom of choice concerning the employment contract and employment period: temporary or permanent.	The employee selects the form and period of employment. The employee decides on a permanent or temporary contract.
Working hours	Unspecified working hours. Flexible working hours.	The employee chooses daily working hours, individually planning their distribution, adjusting the required effort at work to the rhythm of his or her performance possibilities.
Workplace	Freedom to transform the workplace. Independent selection of working tools. The evolution of workplace ergonomics.	The employee selects the form of workplace according to its efficiency. The employee shapes the ergonomics in the workplace.
Job responsibilities	Impact on forming tasks and/or the proportion of the elements of job responsibilities. Impact on improving effects of daily activities. Impact on modifying responsibilities in the job description.	The employee takes the initiative modifying job responsibilities in order to improve the effects of daily activities. The employee affects operational tasks, focusing on good solutions. Work takes on a meaning, it is more of a challenge, which counts for the employee.
Work process	Freedom of choice of the working system. Shaping the rhythm of work according to the rhythm of activity levels.	The employee affects creation and shaping of the work, diversifying and adapting methods. The employee takes part in optimizing work processes, combining tasks with personal preference and adjusting his or her activity levels to tasks.
Development	Personal development programs. Free choice of career paths and its stages. Active participation in shaping individual career plans.	The employee selects and adapts development projects, spreading them over time and being flexible in their implementation.
Remuneration	Cafeteria system of remuneration (the ability to choose from among several packages of remuneration).	The employee selects the remuneration package out of company several cafeteria packages.
Social benefits	Discretionary social benefits, not mandatory. Free opportunity to submit applications. Individual approach to each employee.	The employee has the right to apply for various benefits, social funds, but not everyone may receive them. Applications are dealt with individually on the basis of the criteria adopted.

Source: own based on literature (Hornberger, 2002, p. 550) and personal research 2018

The form and time of employment are presented in the first field. Respondents give high ranking to companies which have highly developed staffing procedures. Such procedures include clear working and pay conditions, with clauses in the contract about a trial period and permanent or temporary employment. Possibilities to modify the employment period, temporary or permanent, are important to the respondents, with the need to connect it to work achievements, especially in the initial stages of work (usually two years).

Information concerning contract terms should be passed to employees already at the start of the recruitment process, and they should be finally confirmed in the first stage of adaptation, i.e. during the induction interview as described at the beginning of this article. This is very important for the effects of the work process. The employee should know and be able to interpret the scope of duties, working conditions, and pay. In the survey more than 88% of the respondents, including all working ones, say they expect repeated confirmation by the employer of the

contract terms established during selection. Respondents state that it is proof of clear and good relations with the employer. This way, they are able to work more and have a sense of employment stability and security. They have a stronger trust in the employer, which can lead to reducing staff turnover, and at the same time the company costs. However, nearly 10% of the respondents say that the employer has a right to set contract terms and can change them, even during the interview or during the admission stage (stage one and two in the adaptation process). The same respondents do not expect any confirmation of the agreed terms from the employer, and they see nothing wrong with that. The remaining 2% of respondents have no opinion on the subject (Table 2).

Table 2. Expectations of the respondents, for clarification and confirmation of the terms of the agreement

Expectations of the respondents concerning clarification and confirmation of contract terms	Working respondents	Nonworking respondents	Total
Question: Do you expect confirmation of the contract and work and pay conditions set out in the selection process?			
I expect confirmation of employment terms.	71 (46.71%)	63 (41.45%)	134 (88.16%)
I expect the employer to decide on employment terms. I don't expect the employer to confirm the contract.	0 (0%)	15 (9.87%)	15 (9.87%)
I have no opinion	0 (0%)	3 (1.97%)	3 (1.97%)
N=152 (100%)			

Source: own elaboration

Generally, what is important to the respondents is the employment period and possibility of negotiating contract terms. They declare that that gives them great freedom of action, and they are able to put more effort into the work, and even to design new solutions. It is expected, especially by the respondents in the age group of 18-30, that the employer should base the decision whether the employment contract is temporary or permanent on the employee's individual needs.

The second individualization field of the HR policy is working hours. Respondents in most cases express opinions that irregular hours of work are more effective than standard conditions (with more than 61% of the respondents, see Table 3). The discussion proves that in company human resources policy working hours are considered the most important individualization field (Table 1).

Table 3. Choice of standard or irregular working hours

Choice of standard or irregular working hours	Working respondents	Nonworking respondents	Total
Question: If you had a choice, would you choose standard working hours of flexible working hours?			
I would choose standard working hours.	19 (12.50%)	16 (10.53%)	35 (23.03%)
I would choose flexible working hours.	42 (27.63%)	52 (34.21%)	94 (61.84%)
I have no opinion	10 (6.58%)	13 (8.55%)	23 (15.13%)
N=152 (100%)			

Source: own elaboration

The respondents' answers depend on the work they do. It is obvious that repetitive work, for example, in manufacturing, should be done during standard working hours, and work requiring designing and individualization can be done during nonstandard working hours. Freedom in the distribution of daily working hours is a sign of Job Crafting use and was considered by the respondents highly satisfactory. However, worrying is the fact that more than 15% of respondents have no opinion on the subject. In the discussion they do not raise this issue, and neither do they suggest any solutions. It can be supposed that this attitude results from short work

experience of some respondents (age range: 92.76% of respondents were 18 to 30 years old, while only 7.24% of respondents were 31 to over 40). It is difficult, in this case, to talk about designing or redesigning their work, when they do not have or they have only a little work experience. It seems that what is needed in this area is awareness and coherence of the objectives, clearly defined expectations, self-criticism, high competence, and at least one-year professional experience.

The third individualisation field of staff policy is workplace. The freedom to choose or create a workplace and to select tools is a sign of creative thinking about work, which in Job Crafting plays a significant role, especially in process mapping, i.e. building dependencies between tasks and the selection of tools, between the involvement of the employee's own energy and the designation of priorities.

Referring to the previously quoted Ergo Work project (2013-2015, N = 480 respondents) it can be said that the adaptation of workplaces to the needs of employees with a variety of disabilities is nothing unique nowadays. It is the main indication of the company concern about work-related functioning of disabled employees. However, for those without dysfunction (the research of 2018, N = 152, discussions) this field is less relevant and less discussed. They limit the problem only to technological equipment of the workplace (opportunity to influence the type of equipment).

For comparison, in the Ergo Work project nondisabled and disabled people were asked a question concerning the degree of adaptation of the workplace to the needs of disabled people and a chance to demand necessary improvements. In Britain 69% of respondents rated the degree of adaptation of their workplace as fairly good or very good. A similar response was provided by 53% of Polish respondents, 51% of those from Slovenia, 39% from Belgium, 38% from Spain, and 37% from Italy (Moody & Saunders, 2015, p. 63). The most common way to deal with the problem of disabled employees was the adaptation of buildings. However, respondents with disabilities did not feel that the place of work had been well adapted and did not experience greater opportunities to redesign their workplace. Disabled respondents felt less happy at work than the others, and did not feel sufficiently included. Compared to employers, employees with disabilities taking part in the survey were less satisfied with the level of the staff's knowledge of the impact of working conditions and workplace adaptation on their needs (Moody & Saunders, 2015, p. 64). Any participation of employees in designing or redesigning their workplace in this case seemed quite limited.

The fourth individualization field of staff policy is job responsibilities. An opportunity for an employee to change job responsibility is quite a significant part of Job Crafting. A question about job responsibilities is often asked during adaptation stages, especially in the third stage, i.e. long-term adaptation. A participatory nature of professional relationship between the employee and supervisor is important for the former, and this participation is manifested in an opportunity for employees to influence a change or redesign of job responsibilities presented in the job description. Moreover, in management practice the opinion of the workers is increasingly expressed openly when they point out deficiencies or imperfections in job responsibilities and obligations contained in the employment contract. Some job responsibility clauses are inadequate to the tasks, or they do not change over time and do not reflect actual professional activities.

Because entities are forced to change their forms of action quickly and the way they operate, employees also have to change the way in which they perceive the company and undergoing changes (Lau & Woodman, 1995, p. 537-554). Employee's participation in forming job responsibilities can significantly affect their understanding of the employer's decisions and of those changes. This can improve everyday performance of the company, and it is satisfactory that more than 74% of the respondents expressed such an opinion (table 4).

Table 4. Freedom to change job responsibilities

Impact on changing job responsibilities	Working respondents	Nonworking respondents	Total
Question: Does participation in describing your job responsibilities affect work commitment and efficiency?			
I think such participation affects work commitment and efficiency.	52 (34.21%)	61 (40.13%)	113 (74.34%)
I don't think such participation affects work commitment and efficiency.	7 (4.60%)	16 (10.53%)	23 (15.13%)
I have no opinion	12 (7.90%)	4 (2.63%)	16 (10.53%)
N=152 (100%)			

Source: own elaboration

The fifth individualization field in personnel policy is the work process. In this field what is important is shaping employee's own work rhythm and activity level rhythm to fit them to the company's needs. Freedom to choose the system of work had a high value for the respondents, with more than 67% of them being of such an opinion (Table 5). For the majority the system of work should be in accordance with the correct production process.

Table 5. A right to choose the system of work

A right to choose the system of work	Working respondents	Nonworking respondents	Total
Question: Is a right to choose a system of work important to you?			
Very important	54 (35.52%)	48 (31.58%)	102 (67.10%)
Quite important	12 (7.89%)	21 (13.82%)	33 (21.71%)
Fairly important	0 (0%)	6 (3.95%)	6 (3.95%)
Not important	0 (0%)	2 (1.32%)	2 (1.32%)
I have no opinion	5 (3.29%)	4 (2.63%)	9 (5.92%)
N=152 (100%)			

Source: own elaboration

In the Job Crafting cycle the preparation stage should be dominant because a wide discussion as well as planning management processes enabling employees to design a system of work is a guarantee of success. The previously mentioned authors of Job Crafting methodology, Amy Wrzesniewski and Jane E. Dutton, suggest that the employees should carry out their task by changing cognitive boundaries and changing interpersonal relationships so as to shape the interaction between managers and colleagues even during the preparation stage (Ashforth, Kreiner & Fugate, 2000, p. 474; Lamont & Molnar, 2002, p. 167-195). Those modified actions and relationship processes are changing the social environment of work, and this in turn changes the meaning of work and professional identity. The above actions, as the research indicates, confirmed the above argument. The objective of these actions is to create a system of work model that defines: (1) individual motivations that trigger the expected behaviour, (2) individual understanding of the system of work that give the possibility of creating various forms of jobs and job responsibilities, and (3) probable individual and organizational effects of individualized approach to create a system of work (Wrzesniewski & Dutton, 2001, pp. 179-201).

Considering Job Crafting in the context of a work system, alongside the aforementioned job profiles, three categories of competence profiles need explaining. The profile of job requirements specifies required competencies for the analysed job. The next one, the worker's competence profile is determined by assessing the competence of the candidate for the vacant position or the competence of another employee doing this job. The third one, the profile of professional suitability, results from the confrontation of the two previously mentioned

profiles. The profile of suitability should be the basis for a decision on staff selection, adaptation, training, and on their movements within the company (Ludwiczynski, 2006, s. 171).

In accordance with the methodology of Job Crafting, employees should participate in shaping competence profiles. It is obvious that they cannot completely redesign work and ways of its implementation this way losing its meaning, but they can improve it, refining it with new solutions (Berg and Wrzesniewski & Dutton, 2010, p. 158-186). In this case, a high degree of autonomy in the employee creativity gives him or her a chance to create solutions, communicating and expressing ideas (Ohly, Sonnentag & Pluntke, 2006, p. 257-279). In taking such an action a few stages must be followed: planning changes, process mapping, calculating the value of changes, solution optimization, implementing solutions, and getting used to changes.

The sixth individualization field in company human resources policy is professional development. It should be admitted that an essential element of work processes is the participation of employees in development management, particularly in the context of planning their own careers (Wrzesniewski, McCauley, Rozin & Schwartz, 1997, p. 21-33). At the stage of selection for the job, the employee should be informed about development opportunities and career programs. Those career development plans should be updated during the third stage, which is long-term adaptation.

From the point of view of psychology and management, the meaning of work emerges when employees feel that it is worth their effort. An awareness of being active during work planning and redesigning gives them a sense of satisfaction and self-fulfilment, which are growing along with their development. Respondents especially rank career path programmes. A concern of the company for those programmes, i.e. detailed plans of different development routes and of their reliable pursuit, is considered very important. However, the approach to their implementation is negative. More than 63% of the respondents believe that in most cases development takes place on paper only, not in reality. The expectations of improvements in this area are very large.

It is notable that efficient management of career development depends on its well prepared systematic implementation, in addition to diligence and mutual effort. A well planned and well carried out action already from the first stage of recruit adaptation should be conducted according to a cycle of consecutive actions. This cycle should include: an awareness of team members of needs and development goals; a diagnosis of available resources and requirements for future actions; adaptation of resources and processes to objectives. Active participation in the design of professional development is declared by almost 60% of the respondents (table 6).

Table 6. Participation in the design of career development

Participation in designing career development	Working respondents	Nonworking respondents	Total
Question: What should your participation be like in the design of career development?			
Active	52 (34.21%)	38 (25%)	90 (59.21%)
Passive	12 (7.89%)	16 (10.53%)	28 (18.42%)
I have no opinion	7 (4.61%)	27 (17.76%)	34 (22.37%)
N=152 (100%)			

Source: own elaboration

More than 18% agree that the company should analyze its resources and capabilities to properly and effectively choose the career for employees. This group would entrust their own professional development to the employer. It could be a good decision, but under several conditions: (1) the company should have long experience in career development, having a good reputation in this area, (2) the company has developed proven solutions and should

be successful in workforce development, and (3) the company is focusing on participation of employees in career planning.

A worrying figure of more than 22% of the respondents do not have any opinion how to design their own career development. In the era of such a strong competition in the market of human resources this attitude is confusing, and it can be assumed that that group of people do not plan their career. However, companies require employees to define their career development expectations. Bearing in mind growing needs of businesses in the field of highly qualified human resources, employees have to adapt to constant change already in the stage of recruitment. The next individualization fields of human resource policy are forms of remuneration and social benefits. Remuneration forms are determined during the first stage (adaptation), in the course of the induction interview.

Respondents express an opinion that this is quite a small activity field (37.5%). The vast majority (43.42%) do not choose any of the fields (table 7). Only 9% of respondents declare that it is a large individualization field in the company staff policy and that they have no opportunities for its redesign.

Table 7. A right to shape forms of remuneration and social benefits

Field of activity in terms of forms of remuneration and social benefits	Working respondents	Nonworking respondents	Total
Question: Have you got any chance to shape the forms of remuneration and social benefits?			
Large	8 (5.26%)	6 (3.95%)	14 (9.21%)
Medium	11 (7.24%)	4 (2.63%)	15 (9.87%)
Small	23 (15.13%)	34 (22.37%)	57 (37.50%)
I have no opinion	29 (19.08%)	37 (24.34%)	66 (43.42%)
N=152 (100%)			

Source: own elaboration

The company system of remuneration is generally well-established having been implemented before, hence the present impact on its changes is negligible. However, there are companies that use the cafeteria system. In this system, employees have a chance to choose a remuneration package, usually out of two to three packages. Thus, it is the employees who decide on the package most corresponding to their needs. This is very satisfactory for employees and meets the idea of Job Crafting. Social benefits are discretionary, and employees cannot lay claims to them, but they can submit applications. This individual attitude constitutes another individualisation field of company HR policy. However, it is rarely used by the participants in the process of Job Crafting.

Conclusions

Matching the employee to the job and the job to the employee in accordance with Job Crafting means accommodating personal and professional predispositions to company requirements. The success of Job Crafting depends on the implementation of company individualization fields of HR policy and on fulfilling the conditions under which the process is conducted.

Job Crafting changes the meaning of work itself and changes the way how work is perceived by the employee. It makes it more challenging and meaningful, giving more satisfaction to the employee. The survey has shown that the present and future employees want to get engaged in the design of their work using Job Crafting. They declare willingness to be active in many specific individualization fields.

It can be assumed that Job Crafting implemented in recruit adaptation stages will bring more benefits than in other stages because at the beginning new employees form and strengthen their opinion about work, employers, colleagues, management, and relationship in the company. They may want to create a better and sometimes innovative solutions. It seems that even small items redesigned by employees in individualization processes could make work more meaningful, and this may positively change an approach to their implementation.

The data collected in the present research are to some extent limited, and the sample is small. The results of the analysis were therefore used judiciously to draw conclusions and to propose solutions that can be implemented in a company to improve the quality of working conditions and to raise awareness regarding issues related to Job Crafting.

It is believed that among company main strategic objectives there should be an increased level of employees' identification with the firm and its performance through effective raising of their involvement in work and building corporate culture. Employees with their variety of competences are capable of creating and implementing innovations and new solutions. In the survey respondents highly rank those companies which are well developed in terms of staffing procedures, with clearly defined working and pay conditions, and with clauses in the contract about a trial period as well as about permanent or temporal employment. Opportunities to influence any changes of the employment period, whether it should be temporary or permanent, are also very important. They believe that it should be based on achievements at work, especially in the early stages of them working for the company. In the individualization of working hours, respondents mostly express an opinion that irregular hours are more effective than standard working hours. This field of individualization of company HR policy is considered to be most important. Thus, it is worth considering which jobs absolutely require standard working hours and which do not need such a rhythm. With a view to making a company more efficient such changes are worth considering.

To questionnaire respondents the least important individualization area is the freedom of choosing and creating their workplace. They declare that freedom to select tools, with its significant role in Job Crafting, is a sign of creative thinking about work, especially for process mapping, i.e. building dependencies between tasks and tool selection, involving one's energy, and designing priorities. In addition, an opportunity for employees to change job responsibilities is quite a significant individualization process because their participation in the nature of work can significantly affect their understanding of activities and changes happening in the company. It can improve everyday performance at work.

In the work process, it is essential for employees to shape their own rhythm of work and rhythm of activity to fit the rhythm and nature of the market. It is obvious that the freedom to choose the system of work and to shape career development has a high value. It is important to update career programs. The other individualisation fields in the company human resources policy, i.e. the form of remuneration and social benefits, do not give employees a larger area to individual action.

In the context of the described individualisation fields in company staff policy interesting areas of research emerge. It is worth verifying empirically which individualisation fields and to what extent affect work efficiency and which management styles inspire employs to use Job Crafting.

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Jarosław Stanisław KARDAS, PhD, DSc, Professor at the University of Natural Sciences and Humanities in Siedlce. He works at the Faculty of Economic and Legal Sciences of the University of Natural Sciences and Humanities in Siedlce. He conducts research in the field of: human resources management, sustainable work, competence management. Research topics: Sustainable work, Good human resources management practices: Analysis and planning.

www.kardas.pl

ORCID ID: orcid.org/0000-0003-3038-6859

Register for an ORCID ID:

<https://orcid.org/register>

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THE SUSTAINABLE DEVELOPMENT OF RURAL TROUPES UNDER THE RURAL VITALIZATION STRATEGY IN CHINA

Jianfei Yang ¹, Jurate Cerneviciute ², Rolandas Strazdas ³

¹ Cultural Development Institute, Communication University of China, Chaoyang District, Beijing, China

^{2,3} Vilnius Gediminas Technical University, Pylimo St.26/1, LT-01132 Vilnius, Lithuania

E-mails: ¹ gwyjf@126.com; ² jurate.cerviciute@vgtu.lt; ³ rolandas.strazdas@vgtu.lt

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Abstract. In line with the rural vitalization strategy of China, the performing organizations are getting increasingly more attention from the government to flourish the traditional culture in rural China. Rural troupes have emerged as a new strength to promote the cultural prosperity. The research team, under support of support of the Public Culture Service Department, State Ministry of Culture and Tourism of the Republic of China, carried out surveys in three characteristic provinces including Hebei, Chongqing and Zhejiang. After analysing the questionnaires, the situation of rural troupes in these provinces is presented. The article discusses the problems and challenges these troupes encounter in their development and provides a model for continuous ambidexteous rural troupe development.

Keywords: rural vitalization; rural development; troupes' development; creative industries

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1. Introduction

Rural troupes could be defined as the troupes who give performance in the rural area. China is a large country with 41.4% of the population living in rural areas. There are different kinds of performing originations with different styles. In the survey, we defined the rural troupes with the Public Culture Service Department, Ministry of Culture and Tourism of the People's Republic of China as follows:

1. The main actors of the performing organizations are peasants.
2. They give performances in rural areas.
3. Most of their audience are peasants.
4. The organizations are commercially oriented.

From the perspective of township, the rural troupes are all private. This kind of troupe is a highly unique performing organization, which has rooted in the traditional relationship and culture in rural area. Most of the members are all peasants making a living from agricultural industries or some other service industries in rural areas. Once performing was a kind of entertainment for peasants in their spare time but now it has become a good way to make money. The troupe is organized based on the relationship of relatives or neighborhood. They have no fixed site or performing plans but give shows in big festivals or on special occasions such as marriages and funerals in rural areas, which are traditional Chinese folk customs. The members are experienced in playing one or two musical instruments or demonstrate other artistic abilities. Agents who are familiar with villagers and have very many ties with different troupes organize most of the performances in rural areas. They invite or organize troupes to give commercial shows whenever there is a need expressed by villagers and get benefit from these activities. A troupe can give different performances according to the customs common to different places in towns or neighboring villages at a fixed price. The troupe meets the demand of peasants and it is also a new way for them to add economic value. From the survey we can see that this kind of performing organization has provided performance mainly to the audience in a rural area. In the meantime, the troupe has provided another way for peasants to make profit on the basis of their own art talent instead of labor and work on land which has been the only way for survival in rural China for thousand years. After conducting theoretical and empirical research on rural troupes, a Continuous ambidexteous rural troupe development model (see Figure 3) was developed.

2. Literature review

In general, rural areas have been associated with certain functions and characters such as agriculture, low number of populations, dispersed settlement patterns and peripherality. Thus, rural represents something opposite to urban and city and is characterized by relatively small settlement patterns and low population density. However, rural areas are not always restricted to any particular land use form, economy or degree of economic wealth, but rurality can be seen more as a socially constructed idea that characterizes it and also differentiates it from urban in specific, but culturally changing, contexts. This kind of rurality refers to different landscapes and a way of living in different cultures and economic spaces (Cloe, 2003).

Rural communities are challenged to move from primary industries and manufacturing to knowledge-based services and to respond to the globalization of national economies and the emergence of complex economic environments. In the changing context, rural communities struggle to preserve historical, cultural and environmental distinctiveness, and achieve economic competitiveness. Changes include economic and technological transformation and evolving social attitudes. Farming is no longer a sole pillar of a rural economy; some economies have successfully accessed or grown amenities for tourism and recreation, cultural and historical heritage, or natural resources for farming. Diversification makes traditional economic development strategies less relevant and meets the changing market conditions (Haggblade, Hazell, Reardon, 2010). Rural communities engage in innovation marketing of natural amenities, cultural heritage and other income-generating strategies attracting people and creating jobs (Woodhouse, 2006) not only in terms of natural resources, but also historical heritage, cultural uniqueness, geographic distinctiveness, human talent and cultural values (Daskon, 2015). To enhance rural communities as place to live, retire and/or holiday. If focus is laid on traditional revenue and employment-generating activities, there is a threat to overlook the opportunities, for embedded knowledge, skills and creative practices that offer a unique community-based learning and growth.

The globalisation of a society has led to the introduction of competition-oriented strategies, whereby cities and regions adopt a more development-oriented and entrepreneurial role. In the neo-liberalist spirit, they take more responsibility for their own development in competition with other cities and regions (Williams, 2003). Culture

and entertainment are central factors in the ability of cities and regions to compete in attracting tourists, new citizens and highly competent labour forces. Current theories of regional development encourage harvesting the grassroots creativity of local communities in order to pursue the regional development goals of particular kinds of. Examples from rural and indigenous communities in Australia and Latin America demonstrate a distinct pattern of tapping into culture, identity and creative expression to draw market resources into particular communities and regions (Eversole, 2005). A deeper understanding of creativity means to help communities reflect on their experience, define and pursue their own regional development goals. Rural communities in disadvantaged regions may find themselves working together to attract outside resources by all possible means: they may target at tourism, perhaps, or try to market local products such as handicrafts or foodstuffs. To draw the needed resources into their region, they must either find what they have that is unique – or create it. Rural communities harness the raw materials of art – if not art itself, in the form of painted streetscapes and music festivals, traditional weavings and local stories – as a way to draw market resources into their communities and regions. Regional development theory concurs that harnessing local creativity is a sound strategy: creative activities are often used by community developers as tools for community building (Boulet, Dunphy, 2005). Yet this ‘community building’ can mean different things: community art activities simply provide opportunities for local people to come together and express themselves or community art activities and events can also be managed and manipulated, so that local people must express themselves according to particular (perhaps externally imposed) categories and value systems (Eversole, 2005).

The promotion of culture and arts within the context of local development strategies may provide a crucial contribution to harmonizing the goals of economic competitiveness and social cohesion (as well as economic and social innovation). The potential for arts to support community development is based on the concept that the arts may connect with broad community agendas, products and services. The concept of community arts derives from a belief that cultural meaning, expression and creativity reside within a community so that the artists assist each other to “free their imaginations and give form to their creativity” (Goldbard, 1993:2).

Many local development initiatives have been undertaken through music (e.g. the Birmingham opera company, UK), theatre (e.g. Theatre of the Oppressed, Brazil), circus (Machincuepa Social Circus, Mexico). Arts do not necessarily provide the solution, but they help to ‘illuminate the way by inspiring people and communities. In case of deprived contexts, arts have emerged as facilitators of communication (Andre, Abreu, Carmo, 2014) by facilitating the emergence of new answers to the unsolved (political, social, economic and environmental) problems. It is apparent that creativity – social, economic or cultural – also exists outside large cities, including rural regions experiencing decline. Rural tourism is often suggested as a possible way for overcoming the difficulties that characterize these territories. In terms of the EU, the support to the development of rural areas has been mainly targeted towards social issues, the preservation of the environment and the landscape, and the diversification of the economic basis (Borup, 2006; Skippington, Davis, 2016).

The literature on cultural industries and creative regions support idea that the arts specifically, and creativity in general, are important to regional (and rural) development - there can be a direct economic benefit to the regions in cultural industries (Gibson 2003, SGS 2004). Residents of small towns and invisible regions can use their unique cultural outputs to challenge the ascendancy of urban ‘creative classes: affirming that creativity itself by nature is neither elitist nor metropolitan. As rural communities are encouraged to take on the challenge of self-help development creatively, they are increasingly tapping into their cultural capital for practical regional development ends. Often this means a close engagement with commercial markets: tourism, handicrafts, and so forth, in order to generate economic returns. The entire communities of people, their identity, culture and creative processes can become the focus of market-oriented regional development efforts. Tapping into cultural traditions of art and craft production to support regional economic development has positive implications for people living

in poor regions as it offers an accessible income-generating opportunity, using the existing skills. It can be an option for people to maintain the existing communities and traditional ways of life while securing better livelihoods through links with external markets. Another positive regional development aspect of traditional art and craft is that they can serve as a form of cross-cultural communication between marginalised groups and the rest of the world, in which the craftsperson-artist communicates his or her way of life and way-of-seeing to outsiders. The development of a museum-shop in a Bolivian city to display and sell these indigenous textiles has led to a greater public awareness of the area's indigenous heritage and traditions and the expressiveness of this traditional art form – providing a tourism resource for the area, while also helping to improve weavers' livelihoods (Healy, 2000).

It is clear that in order to raise the economic and cultural level of rural troupes, their activities need to be constantly and systematically improved. Continuous process improvement techniques such as Six Sigma, Lean and TOC have been applied in manufacturing plants. Later, they were adapted in the service and public sectors (Pepper, Spedding, 2010; Sreedharan, Raju, 2016). A key element of Lean is the Kaizen approach, which is about engaging employees in continuous process improvement (Womack, Jones, 2003). A key element of KAIZEN is the continuous process improvement cycle of the PDCA (Plan, Do, Check, Act). Kaizen teams meet regularly, identify the process issues, anticipate and implement the improvement solutions. The application of the KAIZEN method to creative industries and especially to the development of rural troupes has not been widely discussed. The downside of this method is that it is more focused on improving the existing processes. In addition to developing the existing programs, the development of new show programs is a very important aspect of the activities of rural troupes. This means that efforts to improve the activities of rural troupes should also focus on developing new programs. The question is how to maintain the balance between the existing programs and the process improvement in terms of exploitation of activities and exploration of new capabilities and development of new show programs. The literature addresses this dilemma as organizational ambidexterity.

Organizational ambidexterity has been defined as the ability of an organization to make an effective use of current opportunities, while being able to identify and explore future opportunities and trends. It is argued that balancing exploration and exploitation is fundamental to firm profitability and survival (March, 1991). The existing literature on ambidexterity focuses on inter-firm ambidextrous relationships (Rothaermel, Deeds, 2004; Lavie, Rosenkopf, 2006). There are also efforts to analyze the ambidexterity of public organizations (Cannaerts et al., 2019; Bakhshi, Throsby, 2009; Rinaldi et al., 2015). The development of rural troupes through the application of duality principles has not been widely studied.

3. Research results

The research team, supported by the Public Culture Service Department, the Ministry of Culture and Tourism of the People's Republic of China, performed surveys in three characteristic provinces including Hebei, Chongqing and Zhejiang. The questionnaire has been developed and distributed in these provinces. The team has received and analysed 192 questionnaires. Based on the data received the modern characteristics of the Chinese rural troupes are defined as follows:

(1) Peasants Transform to Full-time or Part-time Performers.

Totally, most of the actors and actresses are from the rural areas that are specializing in some art abilities; some of them are retired professionals from the state-owned theaters in the town or the city. With the development of cultural consumptions, a strong demand on behalf of villagers provides many commercial opportunities for the troupes. Some troupes can receive orders one by one. Many of the members are becoming full-time performers in

the troupe leading to a possibility of another main income in addition to the income generated from agriculture. According to the survey, 12% of the troupe members are full time performers while 86% of them are part-time ones.

Full-time performers are still peasants in the domiciliary register but from the occupation perspective, they have transformed to professional actors or actresses, and the income structure is upgraded from the primary industry to the tertiary industry. During their development, they have produced a unique performance, which is not only different from that available in state-owned theaters but also the ticket price is lower. For example, the Yongnian xidiao is a very traditional Chinese opera in Handan, Hebei province. The troupe has 35 members and their featured performance is the Yongnian Xidio, which performs in a local area and a neighboring town on each big festival and important days/special occasions. Year by year they have built a good reputation and receive a warm response from the audience. In 2017, their income was 2,800 Yuan per one performance which is 300 Yuan higher than that in 2016. They have signed a few performance protocols with some villages and towns and will be performing there on a schedule. According to the statistic, the troupe holds nearly 410 performances a year.

(2) The Performing Skills are More Professional

Though the troupe is self-organized by rural art talents, the actors and actresses are becoming more and more professional with the commercial practice growing year by year. To develop as professionals, the most of these people are insufficiently educated. They have acquired their artistic skills just because of their interests. Many of them have learned from their parents or even grand-parents. Some of them have learned by themselves. Nevertheless, there are still a few professionals who specialize in the opera or in some musical instruments because they have been educated or trained by high-level masters in the region. The troupes can provide different performances including singing, dancing, traditional opera, magic and crosstalk. At the beginning, the performances were of purely amateur nature, later the actors gained more experience their skills became more professional which lead to delivery of high-quality performances and attraction of villagers eager to watch and pay. The troupe members always play two or three roles in the troupe. Everyone is an actor and everyone is a supporter. As years go by and members develop their skills, the division of work is observed in big troupes. There is somebody responsible for performing and somebody for logistics, some of the members - for marketing and so on. Some of them will become superstars in the region, receive high reputation because of a specific program, a song or some other skill.

(3) The Performance Based on Traditional Rural Chinese Culture

The rural troupe serves the villagers in a certain area. The performers and the audience have very close cultural ties with the same living conditions and are even linked with their close relatives. Their performances show the local culture and traditional opera. To a large extent, a troupe can be considered as a symbol of local culture. The survey shows that local opera and intangible-culture heritage performance take a larger part in the performing lists of many troupes. For example, Yue opera in Shenzhou, Zhejiang province is quite famous. Most of the troupes can perform the Yue opera and some of the troupes have their own original programs. As for the Nanxiong Troupes in Wanzhou, Chongqing troupes are specialized in playing different musical instruments and also play in traditional operas. The traditional performance attracts people who are interested in the traditional Chinese culture.

(4) Commercial Relations Rely upon the Traditional Interpersonal Relations

Even though the troupe is quite commercial in the rural market, the official contract is not very important as the activities is mostly regulated by mutual trust. Traditional interpersonal relations are still the center of the commercial performance in rural areas. The agent is always a person who has many different good relations among villagers and has worked in the troupe as a member or a manager. Villagers have much trust in them.

Usually, he is the opinion leader in this circle. With his recommendation, it is much easier to get a commercial task for the troupe. In fact, these agents have a great responsibility in choosing a qualified troupe for villagers because of their pure interpersonal emotions. It is quite different from constructing modern brands. For example, these rural agents in Fuyang District arrange 60% of the local performances.

(5) Services Provided by the Troupes are Becoming Diversified

In the course of the development of rural troupes, their regular performance service has been extended and resulted in the diversification of services. For example, there is a kind of custom that demonstrating/exhibiting/experiencing/having more cries means having more sadness in the funerals. Thus, in some places, rich people ask others to cry in funerals. The troupes sometimes provide this type of services. Apart from that, the troupe also carries on some business when performing in some rural area. "Performing+retail" has been a popular mode for the medium-size troupes. For instance, when performing, they may hold an exhibition of commodities such as cooker, steamer, oven, grill and cultural stuff with a cheaper price. According to the statistic, most of the audience would buy commodities after watching the promotional demonstration. It is a new model of advertising/ promotion/ sales/ purchase called "performing shopping". It becomes an important way for the troupes to generate profit. It is reported that this kind of performing shopping model has created more than 1 million jobs and gross income has reached up to 3.5 billion Yuan per year.

Even though rural troupes have made a great effort and gained much economic and social benefit, still many problems have occurred. Some findings of our survey show the challenges of the rural troupes, as follows:

(1) The Modern Operation System is Weak for Most of the Troupes.

First, most of the troupes, especially small ones, have inexplicit positioning and no performing plans. Most of the members are insufficiently educated. Their aim is to making money though performance. If their performance is popular, they will carry out shows again and again. When the audience is tired of their programs, the troupe will be dissolved. Secondly, they have little sense of marketing. The troupes just give performances when someone invites them or they are given a task to perform by their agent. They have little sense to compete in the market to find a new niche/space and never think about giving performances to the whole city even in the province. Thirdly, they have no efficient managing system. The troupes are established based on personal relations and the common interests in the rural area. The actors and actresses have weak relations with the troupe. There are just aiming at making money for their performance. Most of them have no long-term contracts with the troupe and have cooperation on the case by case basis. Thus, they have low responsibility for the troupe. Furthermore, the leader of the troupe will invest little money in training their members to promote their career.

(2) The Troupes Lack Innovation

Rural troupes are famous for their traditional performances including a local opera. What they perform is an imitation show or an old style of a traditional art, as observed in our survey - 30% of the troupe has no new creative pieces of work. In all, 76% of cultural officials in local governments consider that rural troupes are quite weak in innovation and art creation. One reason is that the original members are not professional but amateur performers. One more reason is that they have undergone little training in professional skills. 61% of the members of the interviewed troupes think they lack creative talents to give new performances. Due to a shortage of money, only 14.7% of troupe members are supported to participate some training programs. Alongside with the development of media, rural villages have access to watching varied performances on TV and on the Internet. The survey shows that nearly 76% of the respondents prefer an original performance versus even good imitation. Another important question is how to innovate old-style traditional performing to meet the modern demands. Thus, the creation and innovation of troupes have become important issues for survival.

(3) They Lack Marketing Strategy

Most of the troupes give commercial performances in the local areas. 68% of them work in the local towns, 26.3% expand to holding shows in the neighboring towns and 5.3% of the troupes who operate well can give performances at the city level or even get a chance to hold shows at the provincial level.

Firstly, they have low knowledge on the modern marketing. Secondly, the programs they show are not popular enough for urban audience. In many cases the urban audience prefer some modern style performance to the rural traditional performance. Thirdly, most of the urban theaters prefer the state-owned performing groups. It is quite hard for rural troupes to perform in these big theaters.

The Income Structure of Rural Troupes

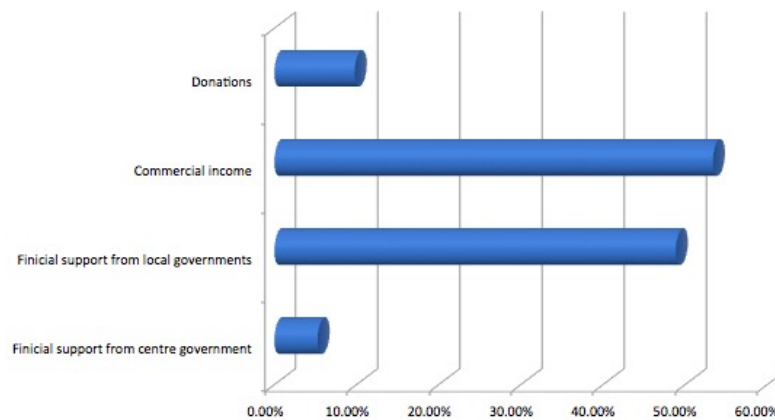


Fig. 1. The Income Structure of Rural Troupes

Source: compiled by the authors

In terms of the income structure of rural troupes, more than half comes from commercial performances (see Figure 1). The local government will provide some support because this or that group has done a lot for rural cultural construction. Local governments encourage these troupes to hold shows and to meet the demand of local villagers to watch traditional operas and other arts.

(4) The Performing Infrastructure in Rural Area is Weak

Our survey shows that the rural performing infrastructure is very weak. There is little effective cultural space for villagers including the stage and other performing equipment. In the rural vitalization strategy, the government pays more attention to the equal rights to each person's cultural development, especially in rural areas according to the rural revitalization strategy. The central government has provided a considerable amount of funds, but the efficiency of the investment should be improved. From the point of view of local and central government it is preference to invest in more populated rural areas. In some villages, there is a lack of young populations. The young generation have moved to cities looking for job, as a result of the ongoing policy of urbanization in China. In average, 70% of the population in rural areas are of the age of 60-80 while only 18% aged 40-60 (see Figure 2).

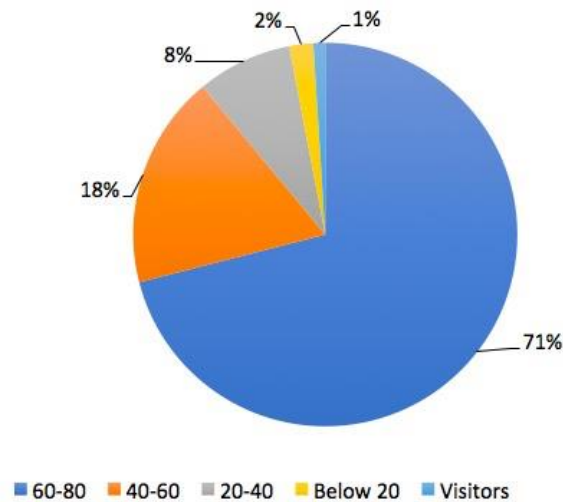


Fig. 2. The age distribution of the audience in rural areas

Source: compiled by the authors

The population structure restricts the investment from governments. When performing, the troupes should build a contemporary stage or just be showing on the ground. This will grow the cost for troupes and the price for the audience will be higher. On the other hand, remote locations in mountainous areas have influenced much to improve infrastructure. It is difficult for the troupes to take large performing equipment when going to villages, which impacted the performing effect very seriously. Thus, weak infrastructure is a huge obstacle in developing the rural performing industry.

4. Discussion and conclusions

After conducting theoretical and empirical research on rural troupes, a Continuous ambidexteous rural troupe development model (see Figure 3) was developed. The model consists of four steps:

i. Establishment of a team for continuous development of a rural troupe. During this stage a team for continuous development of a rural troupe is formed. The team consists of two parts – core-internal team and extended-external team. The main responsibility for a rural troupe development is carried out by the core-internal team, which is formed from most active and motivated members of the rural troupe and the local community. The core-internal team makes a decision on the composition of the extended-external team. It will depend on the identified ambidextrous areas to be developed. The extended-external team is more important for explorative activities e.g. new show programme development, new technology implementation, new commercialization model development, etc;

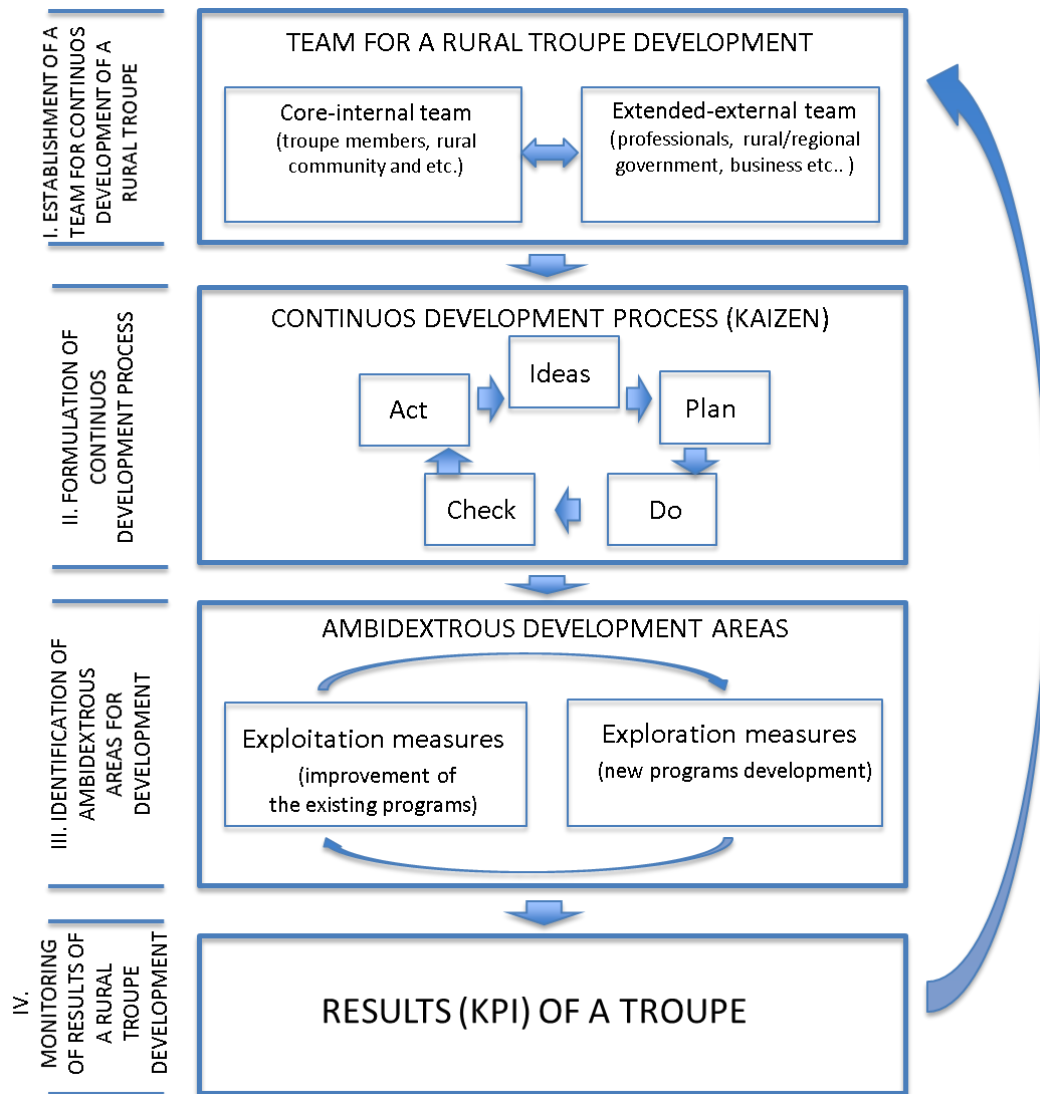


Fig. 3. A continuous ambidexteous rural troupe development model

Source: compiled by the authors

ii. Formulation of a continuous development process. This stage is important in order to ensure not fragmented but a systematic and continuous approach on a rural troupe development. During this stage, continuous development procedures have to be established. It is recommended to use a modified KAIZEN approach. Instead PDCA (Plan, Do Check, Act) model for process improvement, IPDCA (Ideas, Plan, Do Check, Act) is recommended to be used as it will stimulate more creative solutions often needed for rural troupe development especially for exploration activities;

iii. Identification of ambidextrous areas for the development. This stage is important to ensure the ambidexterity of a rural troupe development i.e. at the same time to ensure the efficiency and innovativeness of a rural troupe. During this stage, a team for a rural troupe development have to identify the priority area of the development (exploitation or exploration) to be focused on. As it was mentioned earlier, if the core-internal team identifies the necessity to increase the innovativeness of a rural troupe, the extended-external team, most probably, will have to be formed;

iv. Monitoring of the results of a rural troupe development. At this stage, it is important to constantly monitor the performance of the rural troupe development. Key performance indicators (KPIs) should be established to identify the progress of a rural troupe. The internal team should keep track of the indicators and make decisions on how to further develop the troupe.

Suggestions for the government to make rural troupes more sustainable are as follows:

(1) To enhance the performing infrastructure

Performing infrastructure is very important and the basic foundation to flourish the rural culture. The vitalization strategy pays more attention on it and published a series of documents to promote the traditional opera in rural areas. Thus, the government should invest to improve the quality and quantities of the performing infrastructures.

(2) To enhance Professional Trainings

Talent is the core of the troupes, which has been an important part of rural revitalization of culture. Governments in every level should enhance the training programs for rural troupes and help them to improve the performing skills. First, the government should invite some professionals in state-owned theaters to help rural troupes and help them to improve the ability in performing, operating and marketing. Secondly, the government should organize some training courses for the troupes in different art sectors for free or with a low tuition fee. Thirdly, the government can organize/offer the E-learning course for troupes. Rural citizens are familiar with obtaining information on the web. They can imitate new songs, popular dances through the mobile and the Internet. It will be an easy way for troupes to learn fashionable programs.

(3) To Give an Equal Role to the Troupe in Public Service

In the cultural system reform of China, private performing organizations have gained benefit from it in urban areas. In rural areas, the troupes are still weak and cannot get an equal role compared to the state-owned organizations. Most of them cannot enjoy the preferential policy for different reasons. First, rural troupes can be chosen and included into the purchase list of public services paid by government. Secondly, the government makes efforts to encourage the rural troupes carry out some public performing tasks in a larger market. Thirdly, the government should publish documents to promote enterprise donation to the rural troupes and provide/ assign special financial support for rural troupes to develop traditional performing art.

(4) To Create Rural-Featured Programs

A popular program is crucial for troupes. Governments should organize experts and professionals to create new programs on the theme of rural life and people there. Modern dramas, songs, dances, and comic dialogues for the local people will effectively meet the demand of rural citizens in culture.

(5) To Establish a Performing Association of Rural Troupes

Most of the rural troupes are quite weak. Establishing an association for them is a good way to integrate resources and taking full advantage of each other. In the framework of an association, troupes can exchange information and performers for complementary advantages and become much stronger.

(6) To Stimulate the Implementation of a Continuous Ambidexteous Rural Troupe Development Model

The government should encourage the implementation of a Continuous ambidexteous rural troupe development model (see Figure 3). This is a very important step /tool in ensuring the continuous development of rural troupes. The necessary training and financial support should be provided especially during the initial phase of the model implementation.

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Dr. Jianfei YANG is the senior lecturer of cultural industries in Communication University of China, Beijing and Vice Secretariat of the Research Alliance of Cross-strait Universities in Cultural Creative Industries. He is currently editing academic books on cultural creative industries in Mainland China and Taiwan. Research interests: cultural industries clusters and sustainable development, cultural enterprises and cultural system reform; cultural policies.

ORCID ID: orcid.org/0000-0002-6104-5494

Dr. Jūratė ČERNEVIČIŪTĖ is a professor at the Department of Creative Communications of Vilnius Gediminas Technical University (VGTU). She is currently working on creative industries spillover effect on Lithuanian regions and small towns - Alytus and Utena - sustainable development. Research interest: creative industries impact on sustainable development of regions; system innovation and design-driven innovation development.

ORCID ID: orcid.org/0000-0001-5545-1667

Dr. Rolandas STRAZDAS is a professor at the Department of Creative Communications of Vilnius Gediminas Technical University (VGTU), Lithuania. He is, project manager, researcher, lecturer, and consultant. Research interests incorporate innovation management, business process analysis, business models, creative industries, manufacturing process improvements.

ORCID ID: orcid.org/0000-0002-7163-3337

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KNOWLEDGE MANAGEMENT SIGNIFICANCE AND COMMUNICATION COMPLEXITY IN THE CONTEXT OF INNOVATIVE ENTERPRISES: CASE OF POLISH NEWCONNECT MARKET

Jacek Woźniak¹, Wioletta Wereda²

^{1,2} *Institute of Organization and Management, Faculty of Security, Logistics and Management,
Military University of Technology (Warsaw, Poland), ul. Gen. Sylwestra Kaliskiego 2, 00-908 Warszawa*

E-mails: ¹ jacek.wozniak@wat.edu.pl; ² weredawioletta@tlen.pl

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Abstract. The main goal of this study is to show how the communication complexity influences the knowledge sharing in the organizational dimension, on the example of the NewConnect market in Poland. This paper presents and investigates the above mentioned topics of showing the importance of different forms of communication in sharing knowledge in innovative enterprises based on the questionnaire that has been conducted in NewConnect market in Poland. The empirical study proved that: (1) there is no correlation between the level of communication management in innovative enterprises, (2) the age of the enterprise level and the significance of knowledge management in innovative enterprises, (3) the age of the enterprise and the level of communication complexity in innovative enterprises. The findings of this research give varied and valuable arguments to managers from each sector in paying much attention to different forms of communication with stakeholders in sharing knowledge. This paper is valuable to academics and practitioners in search of reliable data on the influence of modern and traditional forms of communication on sharing knowledge in innovative enterprises, showing the fulfilment of the gap this type of study in the literature.

Keywords: Stakeholders; Knowledge management; Communication complexity; Innovative enterprise; NewConnect market

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JEL Classifications: D83, M10, M31, O31

Additional disciplines: sociology; information and communication

1. Introduction

Communicating with stakeholders and knowledge management processes are the basis for the functioning of today's businesses—in different industries and sectors. In addition, establishing lasting relationships with stakeholders (both internal and external) can determine the broadly understood quality of innovative processes. Therefore, it is possible—in some simplification—to assume that communication with stakeholders and sharing resources (in particular the knowledge) have an impact on the development of enterprises by delivering the

expected value to different units in a business environment. Therefore, communication management and knowledge sharing should be at the heart of the attention of modern managers and businesses' owners (as well as of other groups of employees). It is therefore worth considering how communication with stakeholders and knowledge management are correlated in the context of innovative enterprises' functioning.

The purpose of the article is to show how innovative enterprises operating on the NewConnect market implement communication processes with different classes of stakeholders, as well as treat the knowledge significance in their development. The research problem assumes the following: At what level is the complexity of communication processes with stakeholders (internal and external) in innovative enterprises operating in Poland (on the NewConnect market), and what is the direction and strength of dependence between communication with clients and knowledge management in the context of the development of innovative enterprises?

The research examines traditional and emergent forms of communication with main stakeholders as the communication complexity and its influence on knowledge management in innovative enterprises on the example of Polish market. Traditional communication forms include traditional ways in the form of paper documentation, in the form of direct conversations (face to face communication) and team meetings, traditional phone-call communication. While emergent communication forms include mostly extended IT solutions as email communication, Intranet communication (e.g. exchange of electronic documents, execution of orders, preparation of schedules with tasks, etc.), Extranet technologies and other Internet technologies—enterprise's/corporate's websites, external messengers or memory cases (e.g. for storing and sharing documents), and social networks (Woźniak, Wereda 2018).

2. Communication complexity with stakeholders – selected aspects

Communication with stakeholders in contemporary enterprises can be implemented in various ways, using specific tools and methods (see: Wereda 2018; Dlamini, Ocholla 2018; Shatri 2019). Generally, the way of communicating with the environment is determined by the needs, possibilities and limitations of individual groups of stakeholders (Cai, Yang 2014; Shehu, Shehu 2015; Mišún, Paprskárová, Mišúnová-Hudáková 2019). Global trends (e.g. the development of ICTs) and society's propensity to use them in everyday life and business processes as well as regulatory conditions have the very important role here (see: Zehetner 2019). Unique adaptation to the specificity of a given group of stakeholders makes it necessary to specify the complexity of communication processes. The complexity of this process can be understood as the number of individual, elementary activities undertaken as part of the processes of communication of an enterprise with a definite stakeholder, aimed among others at acquiring, processing and providing information resources (see: Binbin, Haifeng, Yuda, Gibbons 2014). The complexity of communication processes of contemporary enterprises with stakeholders is associated e.g. with the following forms of data, information and knowledge exchange: traditional forms of promotion (press, TV, radio, etc.), paper documentation, direct talks (face to face) and meetings, traditional telephone calls, email accounts, corporate portals (personalized user accounts), external instant messaging, e.g. GTalk, Hangout, Skype, as well as social networking sites/portals (see: Dlamini, Ocholla 2018; Ganis, Waszkiewicz 2018; Shatri 2019; Redeker, Kessler, Kipper 2019). The complexity understood in this way is also determined by the scope of communication processes, that is the number of stakeholders with which the enterprise is in constant contact/relations (business and non-business) as well as the number of functions and processes in the enterprise that are affected by the processes of communicating with stakeholders (see: Binbin, Haifeng, Yuda, Gibbons 2014).

The complexity of the processes of communication with stakeholders—especially in innovative enterprises—requires taking into account knowledge management mechanisms and the operation of this knowledge in the so-called value chain. Therefore, the complexity of communication should be tailored to the given group of stakeholders (Wereda 2018). As a result, it will be possible to determine the optimal level of complexity and

thereby increase the solidity and effectiveness of communication processes. It is worth remembering that active and long-term communication with various, diversified classes of entities (both internal and external) is a source of costs for the enterprise. This is a kind of "an investment". Therefore, the complexity of communication should be properly planned, organized, implemented and controlled, as well as integrated with innovative processes.

At this point it is also worth emphasizing that the complexity of communication of contemporary enterprises—also operating in innovative industries and sectors—should not be determined only by modern forms/methods of communication. Traditional forms are still of great importance, e.g. direct conversations with employees or clients and business partners (Woźniak, Wereda 2018). Such activities, seemingly "outdated", give the opportunity to create trust between the enterprise and stakeholders (Wereda, Zaskórski 2018). It is worth remembering that trust is particularly important in the processes of creating, developing, implementing and commercializing innovations. This indicates the legitimacy of a specific diversification (by combining modern and traditional solutions) of activities and methods taken into account in shaping the complexity of communication processes of innovative enterprises with various groups of stakeholders.

3. Methodology of the research

The subject scope of the study concerns methods of communication (in a traditional or modern way) of innovative enterprises with various stakeholder groups (internal and external). The article also links the issue of the complexity of communicating with stakeholders and the importance of knowledge management in the development of enterprises. The subjective scope of the research is innovative enterprises operating on the NewConnect market in Poland. The study included 60 enterprises (15.7% of entities from the population—population comprised 381 companies from Poland). Data are actual for December 2018 (New Connect Statistic Bulletin 2018). The subject structure of the activities of the surveyed entities is contained in Table 1.

Table 1. Leading business profiles of enterprises (N=60)

Leading business profile	Number of enterprises	Leading business profile	Number of enterprises
Trade	11	Advice and training	7
Computer science	11	Recycling	2
Industrial processing	11	Media	1
Building and construction	8	Eco-energy	1
Financial services	8	Total	60

Source: own elaboration

The study used a random systematic selection (taking into account the criterion of the leading profile of activity indicated for the purposes of the NewConnect registry) in the layers. Respondents were CEOs or managers (of the highest or middle level) responsible for the area of relations with the environment, IT or innovations, employed in enterprises listed on the NewConnect market. One respondent from each company was qualified for the study (Table 2). The structure of the research sample—taking into account different criteria—is described in detail in Table 3.

The empirical study was carried out between November and December 2018 and covered the entire country (16 provinces in Poland). The largest number of surveyed enterprises is based in central Poland. In turn, the least studied entities are located in northern and eastern Poland (Figure 1). Such spatial distribution of the surveyed entities results mainly from the location of companies listed on the NewConnect market—the selection of entities for the research sample reflected the spatial distribution of entities in the entire population. In addition, such a

spatial distribution of the surveyed enterprises points to the fact that the so-called "innovative" entities predominate in western, southern and central Poland—and therefore in the areas that are best developed in terms of industry, services and trade. Northern and eastern Poland are mainly agricultural and recreational areas.

Table 2. Methodology of the research

The components of methodology	Specification
Research scope	An indication of how innovative companies operating on the NewConnect market pursuing communication processes with different classes of stakeholders
Research tool	Computer Assisted Self-Interviewing (CASI)
Entity contracting the study	Institute of Organization and Management, Military University of Technology in Warsaw, Poland
Period of study	2 months (November–December 2018)
Scope of study	Area of whole country (16 voivodships in Poland)
Respondents	Managers or managers responsible for IT, environment or innovation, employed in NewConnect-listed companies (1 respondent per business)
Criteria for selection of research sample	Systematic random sampling (including the criterion of the leading business profile indicated for the purposes of the NewConnect market record) in layers (layers correspond to enterprise size)
The size of the research sample	N=60 enterprises (15.7% of the population—the population constituted of 318 companies, i.e. SMEs and large enterprises, which are based in Poland and mainly operate in Poland)

Source: own elaboration

Table 3. Criteria for description of the research sample (N=60)

	Criteria	Percent of enterprises
Size of enterprise	Micro and small(1–49 employees)	37
	Medium(50–249 employees)	22
	Large (more than 250 employees)	1
Scale of enterprise's operation (multiple choice question)	Local	58
	Regional	60
	Domestic	60
	European	25
	International	5
Age of enterprise (years)	4–9	16
	10–15	19
	16–24	15

Source: own elaboration

The research tool was the Computer Assisted Self Interviewing questionnaire. Respondents on a 5-point scale assessed both the level of use of particular communication channels with stakeholders and the degree of influence (importance) of knowledge management on the development of the enterprise. The results of the evaluation of each question (factor) determined by the respondents were subjected to statistical analysis—factor analysis. The calculations were carried out using the IBM SPSS Statistics 24 software (PS IMAGO 4.0). The study also employed a method of critical analysis of the literature, as well as methods of analysis, synthesis and induction.

Five hypotheses were put forward to achieve the goal of the study:

1. Hypothesis No. 1: Knowledge management significance is at a high level in innovative enterprise.

2. Hypothesis No. 2: Communication complexity with internal and external stakeholders is at a high level in innovative enterprises.
3. Hypothesis No. 3: The higher level of communication complexity (with internal and external stakeholders), the higher level of knowledge management significance in innovative enterprises.
4. Hypothesis No. 4: The older enterprise, the higher level of knowledge management significance in innovative enterprises.
5. Hypothesis No. 5: The older enterprise, the higher level of communication complexity (with internal and external stakeholders) in innovative enterprises.

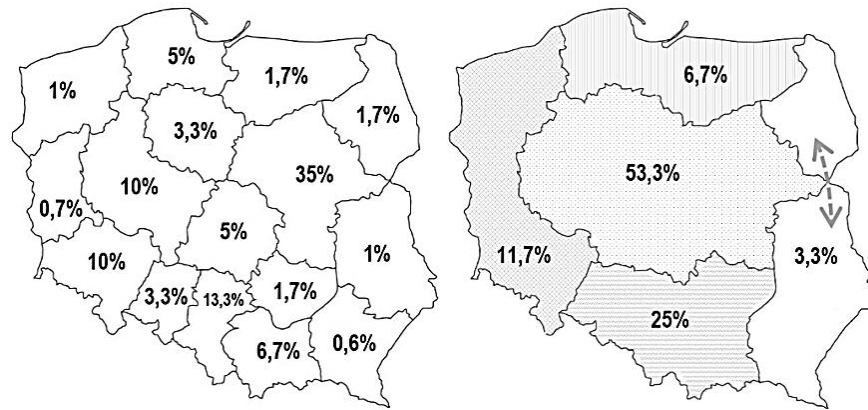


Fig.1. Geographical distribution of surveyed companies in Poland

Source: own elaboration

In order to verify the hypotheses, five composite indices were constructed:

1. Knowledge Management Significance Index–KMSI,
2. CommunicationComplexity Index–CCI, including 4 partial factors:
 - CCI_int–internal (within the enterprise–with employees),
 - CCI_indcust–with individual customers,
 - CCI_instcust–with institutional customers,
 - CCI_buscoop–with business co-operators.

In order to answer the above problem, the article will present the methodology of constructing these indicators, referring to specific partial factors (Table 5 and Table 7). These factors (as generalizations of various activities and processes) have been specified based on the analysis of the subject literature on the forms and tools of modern and traditional communication with stakeholders, as well as the standards and elements and specificity of knowledge management and knowledge activities in enterprises (Czakoń 2012; Dejnaka 2013; Tarabasz 2013; Todeva 2006; Wereda, Zaskórski 2018; Witek–Hejduk et al. 2016; Yashin 1998; Jui–His et al. 2019; Hameed et al. 2019; Park, Kim 2018; Kach et al. 2015; Gao et al. 2019).

Composite ratios were used in the study because: they give a chance to take into account a large number of factors, enable holistic analysis, and provide the basis for a complex, multi–faceted quantification and evaluation of the studied phenomena (Nardo et al. 2005).

Factors included in the study (both for the purposes of the construction of KMSI and CCI) were designed to measure (on a 5–point scale) the approach of enterprises to the implementation of individual activities as part of communicating with stakeholders and the impact of these relationships on knowledge management. The value of

"1" meant that the activity is very rarely implemented or its impact is very low, and the value of "5", that the action is implemented very often or its impact is very large. The reliability of the scale was analyzed using the Cronbach's alpha coefficient to verify the quality of the data.

Table 4. Alfa Cronbach factor for knowledge management significance

Alfa Cronbach	Number of factors	Number of delated factors
0.689	13	0

Source: own elaboration

Table 5. Main factors in the area of knowledge management significance and alfa Cronbach after deleting factors

Factors	Mean of scale after deleting factor	Total correlation of factors	Alfa Cronbach after deleting factor
f1–the formation of specialized organizational cells or posts related to acquisition, processing and sharing data, information and knowledge	41.17	0.496	0.638
f2–the introduction of conscious restrictions to data, information and knowledge for the various positions and management levels	41.58	0.445	0.649
f3–the introduction of the principles of electronic documents interchange	40.73	0.310	0.672
f4–increasing the scope of obtained data, information and knowledge from the environment	40.02	0.262	0.680
f5–increasing the scope of obtained data, information and knowledge from employees	40.10	0.260	0.679
f6–increasing the match of provided data, information and knowledge to the information needs of a given post/managerial level	40.72	0.388	0.661
f7–increasing the level of virtualization (in teams)	41.40	0.371	0.663
f8–enhancing the competences (knowledge and skills) of employees	39.92	0.182	0.686
f9–increasing the level of executives' responsibility for tasks and objectives in the enterprise	40.98	0.234	0.682
f10–increasing the level responsibility of employees which are not managers for tasks	41.12	0.312	0.672
f11–increasing demand for trainings	39.80	0.194	0.686
f12–increasing the reluctance of workers to changes in the enterprise	42.30	0.221	0.688
f13–increasing the scope and level of processing in the direction of active functions supporting the planning, forecasting, as well as multi–dimensioned analysis of data	40.77	0.376	0.663

Source: own elaboration

In order to increase the transparency of the analysis, all indicators will be described together. The KMSI indicator will be presented first. For a full list of 13 factors describing the impact of knowledge management on the development of an innovative enterprise, the value of Cronbach's alpha coefficient was 0.689 (Table 4). Taking into account the methodological recommendations, the obtained value could be considered sufficient. The conducted analysis also indicated that there is no possibility to increase the reliability and quality of the scale in case of removing further factors (Table 5). In contrast, for the four CCI indices, the following Cronbach alpha coefficient values were obtained: CCI_int (0.725), CCI_indcust (0.898), CCI_instcust (0.731) and CCI_buscoop (0.701) (Table 6).

For the construction of KMSI, as well as up to four CCI-indicators, methodological recommendations regarding the development of composite indices developed by OECD (2008) were used. The adopted methodology for the construction of all indicators included the following stages (Nardo et al. 2005):

1. determining the scope of measurement and the legitimacy of using the composite indicator,
2. selection of partial factors,
3. evaluation of the quality of empirical data,
4. assessment of the relationship between partial factors,
5. giving weights to the partial factors and their aggregation to the composite indicator.

The results of the implementation of the first three stages for the KMSI indicator are included in Tables 4 and 5, and for the four CCI indices in Tables 6 and 7.

Table 6. Alfa Cronbach factor for communication complexity with stakeholders

Indicator	Alfa Cronbach	Number of factors	Number of delated factors
CCI_int	0.725	4	4
CCI_indcust	0.898	8	0
CCI_instcust	0.731	8	1
CCI_buscoop	0.701	6	2

Source: own elaboration

Table 7. Main factors in the area of communication complexity with stakeholders and alfa Cronbach after deleting factors

Factors	Mean of scale after deleting factor	Total correlation of factors	Alfa Cronbach after deleting factor
CCI_int			
f1–In the form of paper documentation	13.85	0.590	0.616
f2–Direct talks (face to face) and meetings	13.82	0.447	0.708
f3–Phone (traditional telephone calls)	13.77	0.699	0.534
f4–Email accounts	13.32	0.474	0.723
CCI_indcust			
f1–Traditional forms of promotion (press, TV, radio, etc.)	14.33	0.677	0.888
f2–In the form of paper documentation	13.75	0.880	0.864
f3–Direct talks (face to face) and meetings	12.93	0.423	0.810
f4–Phone (traditional telephone calls)	13.45	0.953	0.855
f5–Email accounts	13.37	0.936	0.858
f6–Corporate portals (personalized user accounts)	14.78	0.240	0.813
f7–External instant messaging, e.g. GTalk, Hangout, Skype	14.27	0.723	0.883
f8–Social networking sites/portals	14.30	0.693	0.887
CCI_instcust			
f1–Traditional forms of promotion (press, TV, radio, etc.)	23.72	0.198	0.721
f2–In the form of paper documentation	21.65	0.739	0.638
f3–Direct talks (face to face) and meetings	21.92	0.617	0.662
f4–Phone (traditional telephone calls)	21.47	0.660	0.670
f5–Email accounts	21.37	0.606	0.682
f6–Teleconferences	24.18	0.389	0.720
f7–Social networking sites/portals	25.08	–0.026	0.714
f8–Corporate portals (personalized user accounts)	24.13	0.344	0.730

Factors	Mean of scale after deleting factor	Total correlation of factors	Alfa Cronbach after deleting factor
CCI_buscoop			
f1–In the form of paper documentation	17.52	0.627	0.593
f2–Direct talks (face to face) and meetings	17.63	0.505	0.638
f3–Phone (traditional telephone calls)	17.12	0.416	0.685
f4–Email accounts	17.08	0.297	0.698
f5–Teleconferences	20.12	0.500	0.642
f6–Corporate portals (personalized user accounts)	20.12	0.374	0.692

Source: own elaboration

In the assessment of relations between partial factors and their aggregation, the factor analysis method was used for the composite indicators KMSI and CCI (by means of the main component analysis–PCA) (Hudrliková 2013). The Kaiser–Mayer–Olkin coefficient and the Bartlett sphericity test were used to verify the correctness of the PCA analysis. The limit value of the KMO coefficient is commonly adopted at the level of 0.5 to 0.7 (Williams et al. 2012). In the case of the KMSI coefficient, the value of KMO statistics was 0.554 (Table 8), and for CCI, respectively: CCI_int (0.675), CCI_indcust (0.713), CCI_instcust (0.740) and CCI_buscoop (0.729) (Table 9). Bartlett's sphericity test for all five indicators showed that the hypothesis of uncorrelated coefficients can be discarded–test statistics are at a significance level lower than 0.001. Further PCA analysis is justified and methodically correct (Table 8 and Table 9).

Table 8. KMO sample adequacy and Bartlett test for KMSI

KMO sample adequacy		0.554
Bartlett test	Approximate chi–square	296.830
	df	78
	Significance	0.000

Source: own elaboration

Table 9. KMO sample adequacy and Bartlett test for all CCI indexes

		CCI_int	CCI_indcust	CCI_instcust	CCI_buscoop
KMO sample adequacy		0.675	0.713	0.740	0.729
Bartlett test	Approximate chi–square	61.981	554.143	224.915	76.294
	df	6	28	28	15
	Significance	0.000	0.000	0.000	0.000

Source: own elaboration

In a further analysis for all five indicators, the method of distinguishing main component factors with Varimax rotation was applied. However, the selection of components was based on the Kaiser criterion, which assumes that the eigenvalues of factors will be greater than "1" (Table 10). In the case of the KMSI indicator, factor analysis gave the basis for qualifying 13 factors to 5 components (Table 11).

Table 10. Identification of the main components of KMSI

Component	Initial values of eigenvalues			The sum of squares after rotation		
	Total	% variance	% cumulated	Total	% variance	% cumulated
1	2.877	22.129	22.129	2.540	19.538	19.538
2	2.512	19.324	41.453	1.991	15.312	34.850
3	1.786	13.740	55.193	1.855	14.268	49.118
4	1.228	9.449	64.642	1.703	13.100	62.217
5	1.058	8.138	72.780	1.373	10.563	72.780
6	0.840	6.459	79.239			
7	0.707	5.436	84.674			
8	0.627	4.824	89.498			
9	0.498	3.828	93.326			
10	0.349	2.684	96.010			
11	0.291	2.240	98.250			
12	0.127	0.975	99.225			
13	0.101	0.775	100.000			

Method of extracting factors—principal components.

Source: own elaboration

Table 11. Matrix of rotated components for KMSI

Factors	Component				
	C1 (acquisition of information resources)	C2 (increase in liability of employees)	C3 (support for data analysis and trust development)	C4 (information circulation and knowledge diffusion)	C5 (informational consistency)
f1	0.170	0.154	0.638	0.076	0.278
f2	-0.146	0.050	0.540	0.653	0.126
f3	0.135	-0.035	0.088	0.740	0.186
f4	0.876	-0.197	0.112	0.071	0.048
f5	0.936	-0.082	0.003	0.109	0.032
f6	0.372	0.263	-0.063	0.416	0.421
f7	-0.102	0.095	0.189	0.187	0.883
f8	0.393	-0.049	0.315	-0.514	0.397
f9	-0.044	0.908	0.039	-0.006	0.041
f10	-0.041	0.946	0.041	0.054	0.091
f11	0.650	0.289	0.152	-0.284	-0.092
f12	-0.250	0.155	0.612	0.385	-0.321
f13	0.189	-0.100	0.772	-0.056	0.079

Rotation method—Varimax with Kaiser's normalization. Rotation reached convergence in 13 iterations.

Source: own elaboration

Assigning individual factors to constituents made it possible to name all components of the KMSI indicator and to give component weights. The weights have been normalized by the sums of the squares of charges that correspond to the part of the variance explained by the component. The construction of four CCI indices was carried out in the same way. The CCI_int indicator consists of only one component, CCI_indcust and CCI_buscoop ratios from two components, and CCI_instcust from three components. The rules of all five indicators are included in 12.

Table 12. Formulas of all indicators specified for the empirical research

Indicator	Formula
KMSI	$= (0.268 \cdot C1)/3 + (0.210 \cdot C2)/2 + (0.196 \cdot C3)/3 + (0.180 \cdot C4)/3 + (0.145 \cdot C5)/2 = (0.268 \cdot (f4 + f5 + f11))/3 + (0.210 \cdot (f9 + f10))/2 + (0.196 \cdot (f1 + f12 + f13))/3 + (0.180 \cdot (f2 + f3 + f8))/3 + (0.145 \cdot (f6 + f7))/2$
CCI_int	$= C1/4 = (f1 + f2 + f3 + f4)/4$
CCI_indcust	$= (0.760 \cdot C1)/7 + (0.240 \cdot C2)/1 = (0.760 \cdot (f1 + f2 + f3 + f4 + f5 + f7 + f8))/7 + (0.240 \cdot f6)/1$
CCI_instcust	$= (0.545 \cdot C1)/4 + (0.265 \cdot C2)/2 + (0.190 \cdot C3)/2 = (0.545 \cdot (f2 + f3 + f4 + f5))/4 + (0.265 \cdot (f6 + f8))/2 + (0.190 \cdot (f1 + f7))/2$
CCI_buscoop	$= (0.545 \cdot C1)/4 + (0.455 \cdot C2)/2 = (0.545 \cdot (f1 + f2 + f3 + f4))/4 + (0.455 \cdot (f5 + f6))/2$

Source: own elaboration

The obtained formulas of KMSI and CCI indicators will be used to verify hypotheses, and the values adopted by these indicators will be described in further parts of the article.

4. Research results

The distribution of KMSI values is characterized by weak left-side skewness, which means that the majority of values were above the average value (Table 13). Considering the fact that each of the 13 factors included in the structure of the KMSI indicator was assessed on a 5-point scale ("1" means very rare/sporadic use of the action, and "5" very frequent use of the measure), the average value of the indicator at the level 3.4354 indicates that on average, the entirety of the importance of knowledge management in the development of innovative enterprises is at a moderate level. The "limit" (median) on a 5-grade scale is 3.00. Generally, it can be assumed that the low level of significance of knowledge management is for KMSI values in the range <1, 2.5, average level in the range <2.5, 3.5), and high in the range <3.5; 5>. However, this is a contractual and standardized division, because precise indication of the level of the importance of knowledge management requires the identification of the needs and capabilities of the company in this respect.

Table 13. Chosen descriptive statistics for KMSI and its components

Statistics	KMSI	KMSI_C1 (acquisition of information resources)	KMSI_C2 (increase in liability of employees)	KMSI_C3 (support for data analysis and trust development)	KMSI_C4 (information circulation and knowledge diffusion)	KMSI_C5 (informational consistency)
N (important)	60	60	60	60	60	60
Gap (Max–Min)	1.67	0.71	0.74	0.72	0.48	0.51
Min	2.51	0.63	0.32	0.20	0.36	0.22
Max	4.19	1.34	1.05	0.91	0.84	0.73
Mean	3.4354	1.1375	0.6650	0.5499	0.6250	0.4580
Standard deviation	0.42265	0.14791	0.16705	0.16462	0.11389	0.12768
Variance	0.179	0.022	0.028	0.027	0.013	0.016
Skew	–0.145	–1.064	0.342	–0.142	–0.274	0.248
Kurtosis	–0.816	2.312	–0.033	–0.408	–0.317	–0.973

Source: own elaboration

The distribution of CCI_int values is characterized by strong left-side skewness, which means that the vast majority of values were above the average (Table 14). The CCI_instcust indicator also has left-sided skewness (Table 15). On the other hand, relatively low right-side obliquities are characterized by CCI_buscoop (Table 16) and CCI_indcust (Table 14)–which means that just over half of the values were below the average value.

Taking a similar assumption, as in the case of RBM, that the low level of communication with a given stakeholder class is CCI in the range <1; 2.5), average in the range <2.5; 3.5), and high in the range <3.5; 5>, it can be assumed that communication complexity:

- with internal stakeholders (in an enterprise) is at a high level (average at the level 4.5625) (Table 14);
- with individual customers is at a low level (average at the level 1.8690) (Table 14);
- with institutional customers is at an intermediate level (average at the level 3.4067) (Table 15);
- with business co-operators is at an intermediate level (average at the level 3.3146) (Table 16).

Table 14. Chosen descriptive statistics for CCI_int, as well as CCI_indcust and its components

Statistics	CCI_int	CCI_indcust	CCI_indcust_C1 (traditional communication and networking)	CCI_indcust_C2 (communication taking into account the information asymmetry)
N (important)	60	60	60	60
Gap (Max–Min)	2.75	2.71	2.71	0.72
Min	2.25	1.00	0.76	0.24
Max	5.00	3.71	3.47	0.96
Mean	4.5625	1.8690	1.6050	0.2640
Standard deviation	0.53604	0.94175	0.91081	0.10550
Variance	0.287	0.887	0.830	0.011
Skew	–1.874	0.590	0.591	5.475
Kurtosis	5.004	–1.403	–1.378	33.381

Source: own elaboration

Knowing the average level of importance of knowledge management for the development of innovative enterprises and the complexity of communication of these enterprises with various stakeholder groups, it is possible to make an in-depth analysis of this issue from the perspective of individual thematic areas (i.e. two components of KMSI and CCI indicators). For this purpose, the results of the factor analysis were used. This enabled the grouping of individual factors for KMSI characterizing the activities under knowledge management in five thematically coherent components (Table 13). Due to the fact that particular factors and components of the KMSI were assessed on a 5–point ordinal scale, the Friedman test was used to assess the degree of importance of knowledge management and the design of a uniform ranking of components (Table 17 and Table 18). The lowest level of significance of knowledge management in the surveyed enterprises concerned the informational consistency (the C5 component)–a result in the Friedman test with an average rank of 1.57. The highest complexity was noted for the component (C1) associated with the acquisition of information resources–the average rank at 4.95 (Table 17).

A detailed list of 13 partial factors assumed in the study for the construction of the KMSI indicator and those subjected to the Friedman test is presented in Table 17. The respondents relatively most often indicated that in the development of enterprises the activities related to: increasing demand for trainings (f–11), enhancing the competences (i.e. knowledge and skills) of employees (f–8), increasing the scope of obtained data, information and knowledge from the environment (f–4), and increasing the scope of obtained data, information and

knowledge from employees (f-5). On the other hand, in the enterprises surveyed, the least chance for development of enterprises (in the context of knowledge management) is seen in: increasing the reluctance of workers to changes in the enterprise (f-12) and the introduction of conscious restrictions to data, information and knowledge for the various positions and management levels (e.g. in the form of procedures of access to information resources) (f-2).

Table 15. Chosen descriptive statistics for CCI_instcust and its components

Statistics	CCI_instcust	CCI_instcust_C1 (traditional communication)	CCI_instcust_C2 (virtualization of communication)	CCI_instcust_C3 (communication aimed at promotion means)
N (important)	60	60	60	60
Gap (Max–Min)	3.30	2.18	0.93	0.38
Min	1.00	0.55	0.27	0.19
Max	4.30	2.73	1.19	0.57
Mean	3.4067	2.5161	0.5455	0.3452
Standard deviation	0.59066	0.40174	0.28874	0.10777
Variance	0.349	0.161	0.083	0.012
Skew	–1.759	–3.287	0.496	0.342
Kurtosis	5.188	12.584	–1.081	–0.537

Source: own elaboration

Table 16. Chosen descriptive statistics for CCI_buscoop and its components

Statistics	CCI_buscoop	CCI_buscoop_C1 (traditional communication)	CCI_buscoop_C2 (modern communication–Internet)
N (important)	60	60	60
Gap (Max–Min)	2.73	1.36	1.37
Min	1.82	1.36	0.46
Max	4.55	2.73	1.82
Mean	3.3146	2.4956	0.8190
Standard deviation	0.62606	0.29839	0.44761
Variance	0.392	0.089	0.200
Skew	0.231	–1.572	0.985
Kurtosis	–0.419	2.775	–0.161

Source: own elaboration

Table 17. Statistics of Friedman’s test and average ranks for each component of KMSI

Components	Average rank	Friedman’s test	
KMSI_C1 (acquisition of information resources)	4.95	N	60
KMSI_C2 (increase in liability of employees)	3.05	Chi-square	151.185
KMSI_C3 (support for data analysis and trust development)	2.35	df	4
KMSI_C4 (information circulation and knowledge diffusion)	3.08	Significance	0.000
KMSI_C5 (informational consistency)	1.57		

Source: own elaboration

Table 18. Statistics of Friedman's test and average ranks for each factor of KMSI

Factors	Average rank	Friedman's test	
		N	60
f1	6.11	Chi-square	273.797
f2	4.73	df	12
f3	7.23	Significance	0.000
f4	9.49		
f5	9.18		
f6	7.07		
f7	5.09		
f8	9.92		
f9	6.17		
f10	5.73		
f11	10.38		
f12	2.93		
f13	6.98		

Source: own elaboration

For a detailed analysis of the complexity of communication with stakeholders, the results of factor analysis were also used. This enabled the grouping of factors for individual CCI indices in (Table 19):

- one component—for CCI_int;
- 2 components—for CCI_indcust;
- 3 components—for CCI_instcust;
- 2 components—for CCI_buscoop.

Also for all four CCI indices, the Friedman test was used to assess the complexity of communication with stakeholders and to create a uniform ranking of components (Table 19 and Table 21).

For the area of communication with individual clients (CCI_indcust), the lowest level of communication complexity in the surveyed enterprises concerned the communication area—the information asymmetry (C2 component)—result in the Friedman test with an average rank of 1.00. The highest complexity was noted for the component (C1) associated with traditional communication and networking—the average rank at 2.00 (Table 19). For the area of communication with institutional clients (CCI_instcust) the lowest level of communication complexity concerned the communication target for promotion means (component C3)—result in the Friedman test with the average rank at 1.32. The highest complexity was noted for the component (C1) associated with traditional communication—the average rank at 3.00 (Table 19). For the area of communication with business partners (CCI_buscoop), the lowest level of communication complexity concerned the area of modern communication—Internet (C2 component)—result in the Friedman test with an average rank of 1.00. The highest complexity was noted for the component (C1) associated with traditional communication—the average rank at 2.00 (Table 19).

For communication with internal stakeholders, a detailed list of 4 partial factors adopted in the study to construct the CCI_int index and subjects subjected to the Friedman test is presented in Table 20. Respondents relatively often indicated that in the formation of the complexity of communication with internal stakeholders the most important is the action related to email accounts (f-4), and the smallest of communication in the form of paper documentation (f-1). For communication with individual clients, a detailed list of 8 partial factors adopted in the study to construct the CCI_indcust index and subjects subjected to the Friedman test is also presented in Table 20. Respondents relatively most often indicated that in shaping the complexity of communication with individual clients the most important activities are: communication in the form of direct meetings (f-3), email accounts (f-5)

and traditional telephone calls (f–4), and the smallest with the use of social networking sites/portals (f–8) and corporate portals (personalized user accounts) (f–6).

Table 19. Statistics of Friedman’s test and average ranks for each component of CII indexes

Components		Friedman’s test			
CCI_indcust					
CCI_indcust_C1 (traditional communication and networking)	2.00	N	Chi–square	df	Asymptotic significance
CCI_indcust_C2 (communication taking into account the information asymmetry)	1.00	60	60.000	1	0.000
CCI_instcust					
CCI_instcust_C1 (traditional communication)	3.00	N	Chi–square	df	Asymptotic significance
CCI_instcust_C2 (virtualization of communication)	1.68	60	94.033	2	0.000
CCI_instcust_C3 (communication aimed at promotion means)	1.32				
CCI_buscoop					
CCI_buscoop_C1 (traditional communication)	2.00	N	Chi–square	df	Asymptotic significance
CCI_buscoop_C2 (modern communication–Internet)	1.00	60	60.000	1	0.000

Source: own elaboration

For communication with institutional clients, a detailed list of 8 partial factors adopted in the study to construct the CCI_instcust index and subjects subjected to the Friedman test, is presented in Table 20. Respondents relatively often indicated that in the formation of the complexity of communication with institutional clients the most important are activities related to: email accounts (f–5), traditional telephone calls (f–4) and in the form of paper documentation (f–2), and the smallest of: corporate portals (personalized user accounts) (f–8), teleconferences (f–6), as well as social networking sites/portals (f–7). In turn, for communication with business partners, a detailed list of 6 partial factors adopted in the study to construct the CCI_buscoop indicator and those subjected to the Friedman test is presented in Table 20. Respondents relatively often indicated that in the formation of communication complexity with business partners the most important activities include: email accounts (f–4), traditional telephone calls (f–3) and in the form of paper documentation (f–1), and the smallest of: teleconferences (f–5) and corporate portals (personalized user accounts) (f–6).

Table 20. Average ranks for each factors of all CII indexes

Factors	CCI_int	CCI_indcust	CCI_instcust	CCI_buscoop
f1	2.25	3.90	3.34	4.26
f2	2.27	4.64	6.25	3.97
f3	2.43	5.73	5.87	4.74
f4	3.05	5.25	6.55	4.83
f5	————	5.39	6.74	1.58
f6	————	3.32	2.68	1.62
f7	————	3.92	1.81	————
f8	————	3.86	2.77	————

Source: own elaboration

Table 21. Statistics of Friedman's test for each factors of all CII indexes

	CCI_int	CCI_indcust	CCI_instcust	CCI_buscoop
N	60	60	60	60
Chi-square	33.538	120.802	345.746	247.865
df	3	7	7	5
Asymptotic significance	0.000	0.000	0.000	0.000

Source: own elaboration

On the basis of the above analysis (Table 13–21) can be made a negative verification of both hypothesis No. 1, that says that knowledge management significance is at a high level in innovative enterprise, and hypothesis No. 2, that says that communication complexity with internal and external stakeholders is at a high level in innovative enterprises. At this point, however, it should be noted that only the complexity of communication with internal stakeholders is at a high level.

In order to verify hypotheses 3–4 the Spearman's rho correlation coefficient was used (Table 22 and Table 23). On this basis, one can make a negative verification of the hypotheses:

- No. 3, that says that the higher level of communication complexity (with internal and external stakeholders), the higher level of knowledge management significance in innovative enterprises; however, it should be noted that a weak, positive and statistically significant correlation only occurs in the complexity of communication with institutional clients and business partners (Table 22);
- No. 4, that says that the older enterprise, the higher level of knowledge management significance in innovative enterprises;
- No. 5, that says that the older enterprise, the higher level of communication complexity (with internal and external stakeholders) in innovative enterprises; however, it should be noted that a weak, positive and statistically significant correlation only occurs in the complexity of communication with internal stakeholders of innovative enterprises (Table 23) .

Table 22. Correlation between CCI indexes, the age of enterprise and KMSI

		KMSI
CCI_int	Correlationcoefficient	0.097
	Significance (reversible)	0.460
	N	60
CCI_indcust	Correlationcoefficient	0.007
	Significance (reversible)	0.957
	N	60
CCI_instcust	Correlationcoefficient	0.305*
	Significance (reversible)	0.018
	N	60
CCI_buscoop	Correlationcoefficient	0.385**
	Significance (reversible)	0.002
	N	60
Age of enterprise (years)	Correlationcoefficient	0.002
	Significance (reversible)	0.987
	N	60
*Correlation significant at 0.05 (reversible).		
**Correlation significant at 0.01 (reversible).		

Source: own elaboration

Table 23. Correlation between the age of enterprise and CCI indexes

The age of enterprise (years)		CCI_int	CCI_indcust	CCI_instcust	CCI_buscoop
	Correlation coefficient	0.310*	0.081	0.018	0.073
	Significance (reversible)	0.016	0.537	0.893	0.578
	N	60	60	60	60
*Correlation significant at 0.05 (reversible).					

Source: own elaboration

Conclusions

Communication with stakeholders and knowledge management are important processes related to the planned and structured development of innovative enterprises. It is worth noting that these processes do not have to always be correlated with each other. They can often overlap independently and affect themselves only seemingly. Furthermore, an enterprise, in order to be considered as the innovative unit, may not have both the complexity of communication with stakeholders and knowledge management development (knowledge significance) at a high level. It must be emphasized that the peculiarity of these both categories depends heavily on industry, market, regulations, customers, etc. The universal (global) dependencies and applications should not be adopted here.

The example of the NewConnect market in Poland shows, that neither knowledge management significance nor communication complexity with internal and external stakeholders is not at a high level in innovative enterprises. What more, it cannot be noticed that the higher level of communication complexity (with internal and external stakeholders), the higher level of knowledge management significance in innovative enterprises, as well as the older enterprise, the higher level of knowledge management significance and the higher level of communication complexity (with internal and external stakeholders) in these enterprises. However, it is important to emphasize that the surveyed companies are widely recognized as innovative business units, operate in modern and progressive industries, as well as are largely oriented at realization innovative projects.

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Jacek WOŹNIAK, Ph.D. Institute of Organization and Management; Military University of Technology in Warsaw (Poland); address: Ul. gen. S. Kaliskiego 2, 00-908 Warszawa; jacekj.wozniak@wat.edu.pl; research fields: risk and efficiency management, creative industries, high-tech industries, ICTs, innovations.

ORCID ID: orcid.org/0000-0001-7592-0109

Wioletta WEREDA, Ph.D. Institute of Organization and Management; Military University of Technology in Warsaw (Poland); address: Ul. gen. S. Kaliskiego 2, 00-908 Warszawa; weredawioletta@tlen.pl; research fields: relationship management, stakeholder relations and engagement, relationship sales, customer service in the business and public sector.

ORCID ID: orcid.org/0000-0002-6948-0239

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THE ROLE OF STAKEHOLDERS IN SHAPING SMART SOLUTIONS IN POLISH CITIES*

Radosław Korneć

*Siedlce University of Natural Sciences and Humanities, Faculty of Social Science,
2 Konarskiego, 08-110 Siedlce, Poland*

E-mail: radoslaw.kornec@uph.edu.pl

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Abstract. Nowadays, cities are approached as complex systems comprising multiple interactions and interrelations. At present, urbanisation is one of the principal socio-economic global processes. Population concentration and myriad different relations between entities lead to highly complicated lives within the urban space. Therefore, the characteristics features of modern cities refer not only to their physical structures, but also to the network of cyber-relations optimising processes occurring within agglomerations. The aims of public governance in urban space relating to the development of intelligent, sharp solutions regarding life quality improvement are undeniably associated with the application of modern technologies. However, one must also take into consideration the role and impact of various stakeholders affecting the process of smart city development. According to the results, stakeholders' involvement is crucial for good management. It is believed that the greatest role in the implementation of intelligent solutions is played by local self-governments. Their leading function is highlighted at the following stages: project conceptualization, implementation and management. Political entities of a more extensive coverage as well as local communities, economic entities and research institutions also play essential role at the stage of concept development. This study focuses on the importance of individual interest groups in the process of shaping intelligent solutions in the urban space. The study is divided into the following sections: Introduction, Literature Review, Methodology, Research Results, and Conclusions.

Keywords: cities; stakeholders; sustainable city; smart city

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1. Introduction

We have been witnesses to a significant growth of the ratio of urbanisation worldwide in recent decades. In February 2007, for the first time in history, urban population outnumbered rural population. In 2018, urban population accounted for 55% of the total population of the world. According to the estimates of the UN, 68% of the global population will be living in urban areas by the year 2050 (United Nation, 2019). In Poland, urban population prevalence has been reported since the 70s, and the urbanisation ratio has been over 60% for several years now (eRegion, 2018).

Progressing city development, even though it remains a symbol of social evolution, poses considerable challenges presented by intensive energy consumption, congested transport networks, water and air pollution, waste, social inequality, and a decrease in the quality of life. What is more, numerous agglomerations are now facing crises due to the shrinking process. This phenomenon involves approximately 370 big centres worldwide, the majority of which are large, old heavy industry centres, which have failed to convert their economies into more modern industry-oriented ones, i.e. focused on biotechnology, IT systems, nanotechnology or dedicated services (Sikora-Fernandez, 2019).

Cities are complex systems featuring multiple connections among citizens, enterprises and numerous transport means and communication networks, including services and tools (Mora et al., 2017). They play a crucial role in combat against environmental pollution, while the implementation of new technologies is perceived as a key factor in reducing emissions of greenhouse gases, pollutants, and improving effectiveness of city operations. The said technologies need to be intelligent, lean, integrated, and cost-effective. They ought to play a major role not only in the field of sustainable development of the environment, but also with respect to citizen wellbeing and financial stability.

For a number of years, the discussion about the directions of development of urban centres has included several concepts changing under the influence of predominant specific developmental factors. Nonetheless, the classic factors of development, simultaneously the basic types of resources (land, work, capital), are insufficient to interpret the contemporary process of city development (Kosiedowski, 2008). Cities may classify these factors (local development factors) in more or less homogeneous groups, some of which are closely interrelated, while others remain unrelated. At the same time, we have a group of factors of a common nature, whereas the occurrence and operation of others may be effected only at some points in time or space (Parysek, 1997). Thus, urban centre management is undergoing considerable changes resultant from sustainable development of cities, and demands and expectations regarding effective resource management.

Nowadays, the objects of city management are not only issues pertaining to the design and planning of estates, districts, buildings, facilities and services, but also to the inclusion of new prospects, such as: digitalization, integration, quality of life, citizens' needs, or bridging the gaps in service accessibility (Axelsson & Granath, 2018; Singgalen et al., 2019). Such demands exert pressure on supervisors and authorities so that urban zone solutions become smart, or at least more effective than they are today.

Technologies, and especially information and communication technologies (ICT), are regarded as the major factors facilitating transformation, whereas the cities themselves are perceived today as centres of technological innovation (Yigitcanlar et al., 2018). Still, the smart city concept covers much more than the technological sector solutions, viewed as a way of receiving better quality urban services and more effective administration (Angelidou, 2017; Anthopoulos, 2015). The operations of intelligent urban mobility, effective methods of water

and energy supply, good waste management, or the provision of high quality services in public benefit institutions is, on the one hand, possible thanks to state-of-the-art technologies and, on the other hand, shaped by the influence of urban centre stakeholders. Typically, the implementation of the smart city idea is regarded as the task of public authorities. However, representatives of economic bodies often attempt to create intelligent realities to pursue their business objectives. Representatives of the world of science, trying to create multidimensional inter-operational open-access solutions so that local communities can actively develop smart public spaces, also have a crucial effect on smart city development (Korzeb, Gołuchowski, & Weichbroth, 2015).

The application of such solutions while catering for social issues, such as welfare, cultural offer or life quality, requires a new, holistic approach to city management, the one which will combine the bottom-up governance with the top down governance, allowing engagement of a variety of stakeholders (city users, such as: city dwellers, enterprises, non-governmental organisations etc.). Therefore, the smart city concept comprises the creation and use of relations and connections between human and social capital and information and communication technologies with a view to attaining sustainable economic growth of the city and improvement of the quality of life of its inhabitants.

The aims of public governance in urban space relating to the development of intelligent, sharp solutions regarding life quality improvement are undeniably associated with the application of modern technologies. However, one must also take into consideration the role and impact of various stakeholders affecting the process of smart city development. This study focuses on the importance of individual interest groups in the process of shaping intelligent solutions in the urban space. The study is divided into the following sections: Introduction, Literature Review, Methodology, Research Results, and Conclusions.

2. Literature review

Nowadays, cities are approached as complex systems comprising multiple interactions and interrelations. At present, urbanisation is one of the principal socio-economic global processes. Population concentration and myriad different relations between entities lead to highly complicated lives within the urban space. Therefore, the characteristics features of modern cities refer not only to their physical structures, but also to the network of cyber-relations optimising processes occurring within agglomerations.

A concept most closely resembling the idea of smart cities is the concept of sustainable development in its broader sense. The idea of sustainable development derives from ecological economics, and its major premise is to warn against increasing exploitation of natural resources in an environment under the pressure of economic process intensification. In accordance with the most well-known definition of the World Commission on Environment and Development (WCED), known as the Brundtland Commission, sustainable development “meets the needs of the present without compromising the ability of future generations to meet their own needs.” (Brundtland, 1987). This implies that “sustainable development” has a broad dimension and refers to more than just environmental aspects; it pertains to economic, social and spatial components in the context of city operations. Its main objective is to ensure high environmental, economic, social, and spatial standards to the present and future city users following the the principle of intra- and intergenerational justice (Rogall, 2010). This means that the condition of continuous sustainable development is its close interaction with three subsystems: spatial (considering the environmental aspect), economic and social; which in turns translates into development management expressed by suitable spatial development creating the conditions necessary for proper use of the potential found in the city (Markowski, 2008).

Along the idea of sustainable development, technological progress, an increase in environmental awareness, and the development of knowledge-based economy, came a number of models of urban space management. Every model aims at a rational use of resources involving the ecological, social and economic space. One of such ideas is smart growth which, with reference to cities, incorporates spatial development oriented at a reduction of costs

related to city expansion. Technologically advanced cities committed to resource saving have been distinguished for some time now. Such centres are referred to as smart cities. Even though the concept of a smart city originated in the year 1994, it had not been an object of substantial scientific or economic interest until the year 2010.

The beginnings of the concept are of technological nature. In its initial phase, smart city used to refer to the application of modern technologies, above all, in the field of information and communication, in the high density space of a city. Then, it was noted that effective collection and management of information could improve operations in various measurable city areas, from waterworks and heating systems to public transportation. At the same time, IT tools started to be implemented in company management, becoming a source of knowledge and experience for managers.

Considerable interest in the concept has been generated also by the actions and regulations of the European Union. With the development of *Europe 2020: A strategy for smart, sustainable and inclusive growth*, research oriented at knowledge- and innovation-based economy became promoted and environmentally-friendly, effective and more competitive economy started to be supported.

The *smart city* concept in the EU instruments was primarily involved with energy sector development and climate purposes. The current focus is also on the use of digital technologies to promote increasing effectiveness, improve living conditions, propagate resource saving and social activation.

The smart city idea has become popular not only on the institutional and social grounds, but also in the academia, who began exploring its various dimensions and dependencies (Letaifa, 2015). Some researchers view it as a remedy for all ills related to rapid urbanisation and the only effective way to achieve sustainable development of cities. Its target is to ensure optimum quality of life in the city (Bakıcı, Almirall, & Wareham, 2013). Cocchia observes that the initiatives such as the Kyoto Protocol, IBM Intellident Plant and the “Europe 2020” strategy have significantly contributed to the development and implementation of intelligent solutions within the urban space (Cocchia, 2014).

Considering the particular interest in the smart city concept, a number of centres and institutions have pointed out the lack of unequivocal definition of a smart city, whereas numerous cities aspire to be deemed as smart ones (Hollands, 2008).

Komninos has made an attempt to define a smart city identifying it as a territory of high learning capabilities and level of innovation, possessing research and development institutions, higher education, digital infrastructure, communication technologies and a high level of management efficiency (Komninos, 2002, p. 1). Lazaroïu and Roscia (Lazaroïu & Roscia, 2012, p. 327) underline that for a city to be called smart, it needs an optimisation of all available and new resources and possible investment. To attain this goal, advanced information and communication technologies are required, above all in the fields of energy, technical infrastructure, public safety, waste management and transport (Sikora-Fernandez, 2013).

The analysis of literature shows two superior approaches to the smart city discussion – the technological approach (TDM) and human capital concepts (HDM). Letaifa (2015) and Colldahl, Frey and Kelemen (2013) claim that there are three elements conditioning smart city existence: technology, people and institutions (Letaifa, 2015; Colldahl, Frey, & Kelemen, 2013). Nonetheless, the reviewed literature does not show significant references to institutions, apart from their effectiveness when it comes to technology and HR administration and exerting impact on people to develop smart cities (Kummitha & Crutzen, 2017). The technological approach to smart cities focuses on technical and environmental aspects of city management and highlights the use and importance of modern technologies in the everyday urban life. As a result, innovative systems of transport and green and efficient systems of energy are created and logistic processes are optimised. The authors investigating this aspect of city operations consider state-of-the-art technologies to be the method to boost service efficiency, improve life quality and reduce impact in the environment. In addition to modern technologies, special attention in the

development of smart cities is paid to human capital, education and creativity (Galán-García, Aguilera-Venegas, & Rodríguez-Cielos, 2014). Neirotti et al. (2014) describe smart cities as a means to enhance the quality of life of their inhabitants (Neirotti et al., 2014). This stream of literature refers to smart cities as urban innovations based on ICT, which aim at using physical and social facilities, natural resources and knowledge to revive economies, environmental effectiveness and public and social services. Lombardi views the social aspect of smart city development through a suitable level of safety and preservation of one's cultural identity. He refers to these elements as the "soft factors" of smart city development (Lombardi et al., 2011, p.4). According to the approach presented by Correia and Wünstel, a smart city is capable of combining the physical and human capitals and develop better services and infrastructure. This allows technology, information and political image to be compiled in an organised city improvement programme (Correia & Wünstel, 2018). One of the most quoted definitions in the field is that presented by Caragliu, Del Bo and Nijkamp, which holds that a city is smart when investment in human capital, information and communication technologies, transport, and infrastructure is carried out through wise and sustainable participatory management (Caragliu, Del Bo, & Nijkamp, 2009) (See Table 1).

Table 1. Examples of smart city definition

Source	Definition of smart city
Hall et al. (2000)	An urban centre of the future, made safe, secure environmentally green, and efficient because all structures—whether for power, water, transportation, etc. are designed, constructed, and maintained making use of advanced, integrated materials, sensors, electronics, and networks which are interfaced with computerized systems comprised of databases, tracking, and decision-making algorithms. (Hall et al., 2000)
Thite (2011)	Creative or smart city experiments [...] aimed at nurturing a creative economy through investment in quality of life which in turn attracts knowledge workers to live and work in smart cities. The nexus of competitive advantage has [...] shifted to those regions that can generate, retain, and attract the best talent. (Thite, 2011)
Caragliu et al. (2011)	A city that is smart when investments in human and social capital and traditional transport and modern ICT infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance. (Caragliu, del Bo, & Nijkamp, 2011)
Nam, Pardo (2011)	A smart city infuses information into its physical infrastructure to improve conveniences, facilitate mobility, add efficiencies, conserve energy, improve the quality of air and water, identify problems and fix them quickly, recover rapidly from disasters, collect data to make better decisions, deploy resources effectively, and share data to enable collaboration across entities and domains.
Lombardi et al. (2012)	The identified clusters are: smart governance (related to participation); smart human capital (related to people); smart environment (related to national resources); smart living (related to the quality of life); and smart economy (related to competitiveness). (Lombardi, Giordano, Farouh, & Yousef, 2012)
Bakici et al. (2012)	Smart city as a high-tech intensive and advanced city that connects people, information and city elements using new technologies in order to create a sustainable, greener city, competitive and innovative commerce, and an increased life quality. (Bakici et al., 2013)
Townsend (2013)	[...] define smart cities as places where information technology is combined with infrastructure, architecture, everyday objects, and even our bodies to address social, economic, and environmental problems. (Townsend, 2013)
Scholl, AlAwadhi (2015)	smart city (definition) is a programmatic term that summarizes the creation, integration, combination, development, and effective leverage of resources and assets towards innovation, attractiveness, competitiveness, sustainability, and livability of an urban space facilitated and accelerated by the ubiquitous use of advanced information and communication technologies with local governments playing key investigating roles in this process. (H.J. Scholl & AlAwadhi, 2015)
Lara et al. (2016)	A community that systematically promotes the overall wellbeing for all of its members, and flexible enough to proactively and sustainably become an increasingly better place to live, work and play. (Lara, Moreira Da Costa, Furlani, & Yigitcanlar, 2016)

Source: own research

Moreover, smart city development necessitates management which stimulates innovation and creativeness, develops cooperation with interested parties, for their participation in the process of public managements is an indispensable element of the smart city concept.

Creating a smart city is a complex operations of organisational, social and IT nature. One of the key success factors of its realization is a proper analysis of stakeholders. It should be noted that they will constitute a very diverse group. The theory of the stakeholders, the foundations of which were developed in the 70s by R.E. Friedman, refers directly to the issue of strategic corporate management. The most crucial assumption is to acknowledge that every company is surrounded by numerous subjects which have a stake (hence the name stakeholders) in the methods and results of its operations. The said stakeholders interact with the company, and with one another, and may exert a real impact on the decision-making process (Friedman & Miles, 2002). The analysed theory presupposes that there is a need to establish and maintain relations not only with the buyers, but also with other entities, such as suppliers, subcontractors, opinion-making bodies, journalists, employees etc. Despite the evident relationship between the theory of stakeholders and private bodies, it has been successfully adopted in public sector research. Its applications can be easily found in the works of Freeman (Freeman, 1984), and others (eg. Axelsson, Melin, & Lindgren, 2013; Flak & Nordheim, 2006; Kamal, Weerakkody, & Irani, 2011; Pardo & Scholl, 2002; Scholl, 2004). The above researchers suggest that, in spite of the presence of certain challenges regarding the theory transfer between the sectors, the public sphere may take advantage of the stakeholder theory. The abilities clearly outnumber the challenges and the argument in favour of the theory's practical application in the public sector focuses on the fact that the operations of public institutions involve many interested parties (Janssen & Cresswell, 2005; Schneider, 2002).

Given the urban centres, stakeholders must be understood in a broad sense. They are the city dwellers, in the first place, but also economic entities operating within a given territory, tourists, municipal officers, local authorities, representatives of city auxiliary bodies, heads of municipal companies, and many others. The interests of various groups may be divergent or even contradictory at times. The solution involving the inclusion of stakeholders in the process of decision-making with respect to the directions of local authorities' activities, allow partner's personal interest in the performed operations. The application of such an instrument improves the efficiency of actions. Partners included in the implementation of urban undertakings are more convinced of their validity. The profitability is also augmented, for there is oftentimes a financial assembly associated with investment performance, which results in lesser financial means engaged. Such a solution may be more advantageous for yet another reason. The involvement of later users of given objects, equipment or networks in their creation boosts one's chance to maximise profits, for the chance of investment meeting the needs is also enhanced (Kudłacz, 2014).

The analysis of source literature demonstrates that every study stresses the role of the stakeholders, both public and private ones, involved in the process of smart city development (Angelidou, 2017; Silva, Khan, & Han, 2018; Stratigea, Papadopoulou, & Panagiotopoulou, 2015). Furthermore, there are claims that smart city stakeholders are often viewed as creative partners in the planning and performance of the "smart" idea (Linders, 2012). However, we must note that there are relatively few studies concentrating directly on the role of various entities in the development of the concept.

3. Research methodology

The subject of the research are Polish cities with a population of 100,000 to 500,000 people, carrying out undertakings aimed at the development of a smart urban space. In addition, they include various interest groups, more or less involved with the said urban activities.

The main objective of the study is to determine the groups of stakeholders having the greatest impact on the implementation of intelligent solutions in the Polish city space. The analysis will lead to the emergence of a group with which the governing bodies should develop a special mode of cooperation.

The research problem, the solving of which will meet the research objective, is to find an answer to the following question: Which group of stakeholders is of utmost importance at individual stages of intelligent solution implementation in the urban space?

The research process was conducted in two principal stages. The first step was to select Polish medium-sized cities implementing intelligent solutions. This was performed on the basis of data recorded by the Central Statistical Office (GUS) and the method of a diagnostic survey using the questionnaire tool. Out of 34 urban centres with a population of 100,000 to 500,000 people, 29 cities declaring to be implementing intelligent solutions in their space were qualified for the study. The group included 6 Polish cities which are listed at “europeansmartcities 3.0”, i.e. Białystok, Bydgoszcz, Kielce, Rzeszów, Suwałki and Szczecin (“europeansmartcities 3.0,” 2018). Next, the structures of entities directly or indirectly interested in city development were identified in accordance with the source literature. With the application of the questionnaire, municipal officers were asked about the importance of individual groups of stakeholders in the process of development of a smart city space. The results obtained constituted the foundation on which the groups of interest with at least a medium impact on the performance of smart city project were distinguished.

The second major step of the research process was to assign the qualified stakeholders to individual groups of interest, i.e. local authorities, local community, political entities and organisations, financial institutions, involved economic entities, research bodies and higher education institutions, the media, and twin cities and institutions. Following the aggregation of various bodies, the respondents were once again asked about the role of individual sets. This time, the process of intelligent solution implementation was split into five stages (concept and design, funding, implementation, management, solution transfer) and respondents were asked to indicate the importance of the groups of stakeholders at a given stage of project implementation.

Here, it should be pointed out that the methodology applied is directly related to a part of research conducted as part of the three-year **ASCIMER** (Assessing Smart City Initiatives for the Mediterranean Region) project supported by the European Investment Bank (*Assessment methodology for smart city projects. Application to the Mediterranean Region*, 2017).

It should be also remembered that researches conducted by means of questionnaire survey have certain disadvantages. First of all, the respondents did not have a chance to ask the author in the case of doubts. Moreover, the respondents being aware that their city is being assessed, could choose answers that would give better marks to their city.

4. Results

The identification of the stakeholders is key to the understanding of their role in the Smart City. In the course of the research, respondents were asked to determine the role of individual entities in the development of intelligent urban space. The impact was assessed with the application of a five-level Likert scale, where 1 signifies a very low and 5 a very high impact. The results of the analysis are presented in the Table 2 below.

Table 2. Type of stakeholders

Type of stakeholders	Min. value	Max. value	Average value
Managing bodies (President, Mayor)	1	5	4.48
City Council	3	5	4.42
Investors	2	5	4.03
International organisations	2	5	4.01
Institutional stakeholders	3	5	4.00
Local Professional Associations	2	5	4.00
Local business	1	5	3.97
Local community	2	5	3.94
Municipal enterprises	1	5	3.84
Individual stakeholders	2	5	3.84
Twin cities	0	5	3.84
Governmental bodies	1	5	3.81
Higher education institutions	3	5	3.81
Neighbouring local authorities	1	4	3.68
Research and development units	2	5	3.58
Local politicians	1	5	3.58
Local investors	1	5	3.58
Marketing agencies	2	5	3.52
Social media (blogs, websites etc.)	1	5	3.48
Administrative staff	1	5	3.42
Schools	1	5	3.39
Associations and foundations	1	5	3.35
Local non-governmental organisations	0	5	3.30
Accreditation bodies and control bodies	1	5	3.29
Governmental bodies	0	5	3.26
Intermediate bodies helping obtain EU funds	1	5	3.26
Loan guarantee funds	1	5	3.15
Political parties	1	5	3.10
Advisory (consulting) bodies	1	4	3.03
Credit unions (SKOK)	1	5	3.03
Sponsors	0	5	3.00
The Press	1	5	2.97
Companies helping receive subsidies from various funds	0	5	2.97
Rating companies (companies providing ratings for local authorities)	0	5	2.81
Local banks	1	5	2.74
Control bodies (State Labour Inspection (PIP), Sanitary Inspectorate (SANEPID), Revenue etc.)	1	4	2.65
Outsourcing companies (e.g. cleaning, property protection, etc.)	0	5	2.65
Training companies	0	4	2.61
Subcontractors	1	5	2.58
The TV	0	5	2.48
Cultural institutions	0	4	2.45
Providers of products and services	0	5	2.39
Religious centres	1	4	2.35
Insurance providers	0	4	2.06
The Radio	0	5	1.87

Source: own research

In the opinion of the respondents, there is a relatively large number of interest groups which have a minimum medium effect on the development of intelligent solutions in the city. By far, the greatest importance is being ascribed to local authorities, i.e. City Mayors, Municipal Councils. What is more, of crucial importance are international organisations and local investors, local business and individual stakeholders. All of the listed groups have at least a large influence on the development of a smart space (grade 4 and higher). Such a distribution may result from the fact that it is the local authorities affecting city development who are responsible for strategy design and implementation. International organisations, such as the European Union, have been supporting innovative initiatives aimed at the creation of intelligent and sustainable space of human activity. The great importance of economic entities in the process of smart solution development is, in turn, associated with the possession of suitable means and appropriate tools. Technological and organisational solutions employed in the private sector may be successfully used in the public space.

28 types of stakeholders were qualified to the next research stage. The groups with an average low and very low impact were rejected (grade 3 and below). The remaining stakeholders were assigned to larger groups in accordance with their specificity and further analysed. See Table 3 below.

Table 3. Groups of stakeholders

Group of stakeholders	Type of stakeholders	Min. value	Max. value	Average value
Research & Development Institutions	Higher education institutions	3	5	3.81
	Research and development units	2	5	3.58
	Schools	1	5	3.39
	Accreditation bodies and control bodies	1	5	3.29
	Advisory (consulting) bodies	1	4	3.03
Local authorities	Managing bodies (President, Mayor)	1	5	4.48
	City Council	3	5	4.42
	Local politicians	1	5	3.58
	Administrative staff	1	5	3.42
Country-wide political bodies	Governmental bodies	0	5	3.81
	International organisations	1	5	4.01
	Political parties	1	5	3.26
	Governmental institutions	1	5	3.10
Financial Institutions	Credit unions (SKOK)	1	5	3.26
	Intermediate bodies helping obtain EU funds	1	5	3.15
	Loan guarantee funds	1	5	3.03
The Media	Marketing agencies	2	5	3.52
	Social media (blogs, websites etc.)	1	5	3.48
Local community	Individual stakeholders	2	5	4.00
	Local community	2	5	3.94
	Local Professional Associations	2	5	3.84
	Associations and foundations	1	5	3.35
Economic entities	Local investors	1	5	4.03
	Local business	1	5	4.00
	Institutional stakeholders	3	5	3.97
	Investors	2	5	3.84
	Sponsors	0	5	3.58
	Municipal enterprises	1	5	3.00

Source: own research

The next step was to establish the involvement of individual groups of stakeholders in the projects aimed at implementation of smart solutions in the urban space. As part of the aforementioned ASCIMER, a framework model of management of the projects of this sort was developed. The model is universal and can be applied in many other researches in the field of smart city. It represents individual steps undertaken in the process of management and the degree of involvement of individual groups of stakeholders. The process of development of projects shaping the smart urban space was divided into five stages:

1. Concept and design
2. Funding
3. Performance
4. Management
5. Solution transfer

Stakeholders' involvement is crucial for good management at all of the said stages. It is believed that the greatest role in the implementation of intelligent solutions is played by local self-governments. Their leading function is highlighted at the following stages: project conceptualization, implementation and management. Political entities of a more extensive coverage as well as local communities, economic entities and research institutions also play essential role at the stage of concept development. According to the respondents, the pivotal role in funding is assumed by financial institutions providing support and loan guarantees. The group of stakeholders included in the set "twin cities and institutions" has the largest impact in the sphere of intelligent solutions. Also local authorities taken on a dominant position here. The transfer may be in multiple directions, it may relate to various solutions, relatively easy to implement in another city. See Table 4 below.

Table 4. Importance of stakeholders in smart city projects development process

	Groups of Stakeholders							
	Society	Local self-government (provincial authorities)	Political entities and organisations	Financial institutions	Involved economic entities	Research and higher education institutions	The Media	Twin cities and institutions
Concept and design	3.81	4.56	4.13	3.03	3.87	3.87	2.52	3.71
Funding	3.68	3.76	3.91	4.87	3.94	1,9	1.81	3.29
Implementation	2.58	4.26	2.61	3	4.01	3.39	2.29	2.39
Management	1.29	4.16	1.98	2.12	3.61	3.39	1.97	1.35
Solution transfer	2.16	3.81	3.56	3.54	3.77	3.71	2.94	4.04
Average value	2.70	4.11	3.24	3.31	3.84	3.25	2.31	2.96

Source: own research

The role of local communities is particularly interesting, for all implemented solutions are not only to effectively manage urban centres but, first and foremost, to create a friendly environment which guarantees high quality of life of its inhabitants. Projects allowing swift communication, free access to drinking water, breathing fresh air, effective handling of various civic matters in municipal councils or relaxing in the urban greens, are oriented, in principle, at local communities. Local communities were regarded as more important than the media, who play a minor role at every stage of project realisation, only.

5. Conclusions

Cities featuring undesired phenomena such as heavy traffic, air pollution, acoustic disturbances, landscape degradation, or excessive and chaotic growth, are considered to be unfriendly not only to humans, but also to the operations of business entities. The priority of local authorities' actions should be, above all, to increase effectiveness of urban centre operations. In the pursuit of being termed a smart city, local governments are compelled to follow certain politics of resource management. The role of local authorities is highlighted also in

the present study, focusing on the significance of the stakeholders in the process of implementing intelligent solutions in Polish cities. Additionally, the results obtained in the course of the analysis seem to confirm the outcomes of the studies conducted as part of the ASCIMER project and regarding the smart city concept in the cities of the Mediterranean region. The central role of local authorities in the development of the smart city idea has been underlined by other authors (Bolívar, 2016; Jiménez, Solanas, & Falcone, 2014; Simonofski, Vallé, Serral, & Wautelet, 2019). It should be emphasised that intelligent space is created mostly for the city dwellers. The results of the study demonstrate that the potential of the inhabitants of Polish cities is exploited to a very limited extent. To release this potential constitutes one of the challenges because, as indicated by good practices and other research, participatory management is one of the absolute conditions for ensuring full implementation of the smart city concept (Berntzen & Johannessen, 2016; Bertot, Jaeger, & McClure, 2008; Hudson-Smith, Evans, & Batty, 2005; Kim & Schachter, 2013). Moreover, source literature shows studies identifying factors affecting the construction of the strategy of citizens' involvement in the management process. The significance of local communities in the implementation of the smart city idea is further highlighted due to the more frequently appreciated role of soft city management factors. In addition to state-of-the-art technologies, local identity and knowledge are of profound importance and should be the practical foundations of intelligent cities and the source of city values (Sepasgozar, Hawken, Sargolzaei, & Foroozanfa, 2019). Despite the declared performance of projects shaping intelligent space, Polish cities are still in the early phase of development. To quote the authors of the report entitled "Intelligent solutions in Your city!", most actions of local self-governments in Poland continue to focus on the most indispensable investment in hard infrastructure (such as road maintenance) ("The Polish City of the Future: Intelligent Solutions in Your City!," 2018). Sadly, it makes it hard to catch up with the smart urban centres of Scandinavia, Austria, Italy, Holland or the United Kingdom. Therefore, to materialize the concept of smart cities in Poland on the basis of more than mere infrastructure modernization or modern technology implementation, presents a serious challenge to Poland. A critical issue in every project is and will be the local community and its major importance in the development of intelligent space. One of the latest national initiatives was a subsidy competition announced by the Ministry of Development in July 2017, targeted at local authorities and entitled "Human Smart Cities. Intelligent cities co-created by their inhabitants". Perhaps, in a few years' time, thanks to such actions Polish cities will become 'smarter' (and more innovative) and, consequently, climb up the international rankings.

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Radosław KORNEĆ, PhD, is a Lecturer in the Faculty of Economic and Legal Sciences at Siedlce University of Natural Sciences and Humanities in Poland. Dr. Kornec's research is focused on road transportation in the context of roads safety, ecological security and sustainable development.

ORCID ID: orcid.org/0000-0002-5949-0089

Register for an ORCID ID:

<https://orcid.org/register>

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THE IMPORTANCE OF ACCOUNTING AND REPORTING IN THE PROCESS OF FINANCE MANAGEMENT IN A BASIC UNIT OF THE TERRITORIAL GOVERNMENT

Monika Wakula

Siedlce University of Natural Sciences and Humanities, Faculty of Social Sciences, Żytnia Street 17/19, 08-110 Siedlce, Poland

E-mail: monika.wakula@uph.edu.pl

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Abstract. Currently units of the territorial government function in a quickly changing environment. To be able to survive and work in accordance with their mission, they must undertake a wide range of decisions concerning finance management. In order to do it accurately and minimise the risk of a badly made decision, people responsible for the management should have access to full and reliable information. The information derives from the accounting system and in particular from its last stage - reporting. The aim of the article is an attempt to find the answer whether accounting and reporting applied in basic units of the local government provides essential information to make appropriate decisions, especially the financial ones. To fulfill the goal, the analysis of literature and legal acts was conducted. In addition, empirical studies were carried out in communes of Siedlce- subregion and Ostrołęka subregion.

Keywords: reporting; accounting; commune; management

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1. Introduction

Social and economic transformations, which took place in Poland, led to the shift from centrally-planned economy to the market economy. As a result of that, there were numerous changes within the scope of systemic relation of the state and its bodies, both private and state ones. At the same time, economic transformations resulted in the fact that some economic, legal and social problems were revealed through the whole country as well as in local communities (Wartalska, 2007). The problems were to be solved by central authorities with the help of the territorial government whose basic unit was said to become a commune. Its position in the system of power and economy forces a particular care and attention paid to rational use of available resources in the widely understood interest of the local community.

One of the main areas of general management is finance management which may be defined as a sequence of financial decisions made in order to manage the commune resources in a rational way.

People responsible for making decisions should have access to full and reliable information. The demand for financial information is fulfilled by the information system such as accounting, and in particular, its last stage - financial reporting. 'Success' of a given unit of the territorial government is in a he extent dependent on the quality of information derived from the system and its proper use. Thus, there has been observed a significant increase in the significance of accounting as an information system used in basic units of the local government. Accounting is a tool which enables us to increase the efficiency and effectiveness of the management of communes.

Due to the facts described above, the article contains criticism concerning rules of accounting and reporting existing in Polish communes.

The aim of the article is an attempt to find the answer whether accounting and reporting applied in basic units of the local government provides essential information to make appropriate decisions. The article will be also an attempt to indicate a modification to the way of cost records in basic units of the territorial government, which may be the first step to ensure usefulness of information in the process of management and as a result to the reduction of wasting public funds.

The fulfillment of such a goal will be performed on the basis of the analysis of the subject literature as well as on the empirical studies conducted in Siedlce subregion and Ostrołęka subregion.

After analysing the subject literature and practices applied in basic units of the territorial government, the following thesis has been formulated: present accounting and reporting used in communes do not provide enough information for managerial purposes and are conducted only because it is needed as a fulfillment of some legal requirements.

The problems described in the article are similar to the research conducted by numerous authors. Studies concerning the issue of using accounting for managerial purposes in units of the territorial government were started in the 1990s by prof. A. Jaruga (1988, 1990, 2007, 2001). The subject was also analysed by such authors as B. Filipiak (2009), A. Zysnarska (2010), M. Dylewski (2011). Foreign writers dealing with the issue included Nogueira S.P.S Jorga, Oliwier M.C. (2013), Efendi R., Dewi F.G, Gamayuni R.R. (2018), Cohen S., Karayzimans S. (2017), Andriani Y., Kober R. (2010), Agriyanto R., Rohman, A., Ratmono D., Ghazali, I. (2016), El Idrissi, N. E. A., Ilham Zerrouk, I., Naoual Zirari, N., Monni, S. (2020).

2. Literature review

Having departed from the centrally-planned economy, Poland had to create new accounting for the needs of the free-market economy. On 1st January 1995, a legal act of 24th September 1994 on accounting was introduced and it has been valid until today. It is a very important act that regulates functioning of accounting in all economic units, including communes. Obviously, due to the specifics of the units of the territorial government, including communes, reporting of the group units must be additionally determined by the legal provisions within the scope of public finance. The law valid in this scope is the Act of 27 August 2009 on public finance. Additionally, the regulations were improved by Regulation of the Minister of Development and Finance of 13 September 2017 on accounting and charts of accounts for the state budget, budgets of units of the territorial government, budgetary units, Local Government Budget Divisions, state-run specific purpose funds and state budget units based outside the Republic of Poland. The legal act defines detailed rules of accounting and charts of accounts for units of the sector of public finance.

Accounting of the budget sector fully applies to the same principles and fulfills the same functions that are performed in the private sector, however, the environment in which it functions is distinct by nature and the events and transactions recognised in its system are more complex (Kiziukiwicz 2014). The aspect that should be taken into consideration while discussing budget accounting is the principle of book-keeping records. The cash method is a form of presentation, execution and control of the execution of budget tasks, which is valid in the Polish law. Planned and executed income as well as expenditure constitute only such figures which were deposited into the account or spent in a particular budget year. Budget - in a tangible approach - a plan of tasks which have to be performed both as income and expenditure - is not equivalent with the real crediting or liability to the budget, whereas budget execution comprises only such expenses that were settled and only that income which was credited to the budget account. Practically, it results in the fact that in the tangible approach, the task is performed whereas in the cash method - it is not, which is reflected in the reports from the budget execution.

The rule is concise and easily accessible. It is suitable to draw up a traditional budget and to exercise budgetary powers given to particular decision-makers. The cash method is relatively simple from a technical point of view. It is not connected with subjective opinions and does not include preliminary estimates.

Despite all the benefits of the cash basis presented above, a lot of authors think that it is necessary to get rid of it in favor of the accrual basis.

The most serious drawback of the cash basis is, according to many authors, the possibility to manipulate the budget result. The existence of the possibility does not encourage people to manage funds intended to cover expenditure in a given budget year in a rational way. It results from the fact that accounting conducted according to the cash basis does not generate information concerning the state of the liabilities. It leads to lack of the possibility to determine the level of maturity in subsequent years, which results in the apparent decrease of the budget deficit in a given year.

Information concerning the costs of functioning of a unit are the most important to make management decisions. Without it, it is impossible to conduct any economic activity. Costs reflect the quality of work at all segments of the organization activity. The problem of incurring and implementing costs is a basic task of managers in each organization. Budgetary accounting conducted in accordance with the cash basis does not give any possibility to calculate costs of the provided services, nor does it make it possible to determine general operational costs of a unit. Accounting books include payments made, regardless of the fact whether they concern the costs of the period. According to the quoted Act on particular accounting rules, units of territorial government draw up the profit-and-loss account in a comparative version. The consequence includes the necessity to record costs by nature. Costs accounted by nature allow us to achieve information concerning the size of aggregated consumption of production factors in a particular period in the cross-section of simple, homogenous and indivisible costs. Cost records by cost nature is sufficient for reporting purposes, however, to make appropriate management decisions in the units of the territorial government, it is too aggregated. It may lead to the increase of the possibility of making mistakes during cost budgeting and may lower the effectiveness of the system of providing information. To be able to contribute to the increase of usefulness of information concerning the costs from budget accounting, it would be necessary to develop the system of cost reports. It is a very costly process which may meet many obstacles in a unit of the territorial government due to the specifics of its financing. A limited amount of financial means requires actions which will bring appropriate effects and which are not a financial burden for the units. The solution may be an analytical structure of cost records by cost nature, in which the structure of costs by nature would be developed in such a way to make decision-making processes easier. The introduction of the system of cost records by cost function and the use of record solutions could contribute to the obtaining of detailed information essential for the appropriate process of making management decisions. It would be possible to distinguish responsibility centers which would have tasks allocated to them as well as funds provided for their execution. It would also be possible to make a person who has proper qualifications responsible for the activity. It

would lead to obtaining information on costs of supplies, production, sale and management. The advantages and disadvantages of the suggested solutions in the system of accounting and their influence on the process of making decisions are presented in the further part of the elaboration (A.J. Kozuch, M.Wakuła, 2012).

The cash basis does not provide any stimuli to use fixed assets in an effective way. It is caused by the the same treatment of costs concerning employment and capital expenditure. The fact that the latter will be productive throughout many years is omitted.

The disadvantages presented above show that it is impossible to present costs connected with operational activity of a unit in a given reporting period in a reliable and credible way. It is also not possible to measure the costs of provided services and evaluate the results of the unit's activities.

According to R. Guerreira de Souse (Gurrera de Sousa, 2013), the cash accounting can be characterised as easy to conduct, highly objective and limited in choices. The fault of the system includes divergences between income and expenditure, which may disturb the records of real costs of activities and do not confirm income in a proper way.

On the basis of the above deliberation, it can be stated that accounting conducted according to the cash basis does not provide enough information to make appropriate management decisions and makes it impossible to evaluate effectiveness of the activities performed.

Here, it is advisable to ask a question why, despite so many flaws of the accounting system of the cash basis, this model is still used in units of a territorial government? While answering the question, it is essential to take into account numerous factors including: resistance to changes or lack of qualified staff.

The antidote to the abnormalities resulting from the application of the cash method in communes may be the introduction of the obligatory accrual basis in accounting records. The European Commission is also in favour of its introduction suggesting the development and implementation of Accounting Standards in the Public Sector (the European Commission, 2013, Nowak, 2015). Such a solution would be helpful while conducting all the comparative analyses taking into account the effectiveness of spending funds on the same tasks by particular units of member countries at all levels (Szołno, 2017). Similarly, the tendency to shift from the cash method to the accrual basis is noticeable on the international scene. That solution was chosen by self-governments of such countries as: Switzerland, the Netherlands, Sweden, Spain, Great Britain, Finland, Italy and Germany (Luder, Jones, 2003). A higher usefulness of the accrual basis in the budgetary accounting was confirmed by the research results conducted by Andriani Y., Kober R., (2010), Cohen S., Karatzimans S., (2017). The analyses conducted by Agriyanto R., Rohman, A., Ratmono D. and Ghazali, I. proved that the implementation of the budgetary accounting in City Government Semarang significantly and positively influenced the process of making decisions.

Results of the research conducted in Portuguese communes by De Silva, Nogueira SPS confirmed the fact that internal policymakers started to notice the significance of information derived from the system of accounting and reporting. The accrual basis existing in the units increased the quality of information and significantly influenced the relevance of making decisions.

As early as in the 1980s, Switzerland introduced the accrual basis of accounting to the public sector. On the basis of the research conducted by Bergamnn (2012), it can be stated that information taken from the accrual accounting was used while making decisions concerning internal control and setting goals of fiscal policy. The author cooperating with Fuchs and Brrusca I (2017) carried out research in 15 Swiss territorial self-governments. It aimed at evaluating the influence of the reforms of the accrual basis on financial reporting and determining the influence of new information on decision-making processes. The achieved results showed that the accrual

reporting was a significant instrument to achieve dynamic local finance. The research also revealed that accrual accounting reforms were a significant starting point for a more strategic use of newly obtained financial data.

The accrual accounting in the public sector was also introduced by Indonesia. The country reformed its system of accounting and reporting by introducing the system of reporting called 'cash towards accruals'. On the basis of the research conducted by Mir M., Harun H., and Sutyono, W. (2019) in 5 local self-governments of Indonesia, it can be stated that the implementation helped local authorities to obtain reports containing complete information.

Nakmahachalasint, O. and Narktabtee, K. (2019) in their research conducted in Thailand showed a number of problems encountered by the country while implementing the system of accrual accounting. They specified the most important ones including the resistance of the employees of the public sector, lack of understanding of the significance of information derived from the system of accrual basis of accounting as well as lack of informational materials on the topic.

Very interesting results were provided by the research conducted by Cuadrado-Ballesteros, B., Cito, F. and Bisogno, M. (2019) in 33 self-governments of countries of the Organization for Economic Cooperation and Development between 2010 and 2014. On the basis of the results, it can be stated that reforms in the public sector aiming at the implementation of the accrual basis of accounting contributed to the weakening of corruption, which was a problem in many countries. The introduction of the method weakened the information advantage of politicians over citizens.

The basic source of information on the situation in units of the territorial government is reporting of a local government unit which includes financial reports and budgetary reports.

To present the current condition of reporting of a unit of the territorial self-government and to evaluate it, it is necessary to classify the recipients of the information and their information needs. According to K. Winiarska, the form of reporting results from information needs of the surrounding and is determined by particular legal acts (Winiarska, 2016).

According to A.D. Riahi-Belkaoui, information users on communes are resource providers, tax-payers, loan-takers, non-financial resource suppliers, employees, members and donors, users of the products provided by a unit, subjects responsible for the policy and for the supervision and evaluation of unit managers, i.e. the competent regulatory authorities and supervisory bodies, unit managers who are not business-oriented (Riahi-Belkaoui, 2004).

M. Jastrzębska claimed that users of information on basic units of the territorial government were: government and its bodies, regional and local authorities, members of local communities, private entrepreneurs, potential investors, lenders and borrowers, employees and their trade unions, service providers and their business partners taking part in performing tasks of a unit of the territorial government (Jastrzębska, 1999).

On the basis of the deliberation mentioned above, recipients of information on communes can be divided into two groups. One of them consists of external recipients (citizens and business units). The other group includes internal ones (the authorities of a basic units of the territorial government).

It should be emphasised that each of the users of external reporting has various information needs. According to W.A. Nowak (2014) they may include: types and values of material fixed assets, consumption of the fixed capital, social programs conducted and tax liabilities.

The information needs of the government and its bodies as well as other self-governments are fulfilled by external reporting which has the uniform form regulated by national and international laws (Firkowska-Jakobsze, 2017). In K. Winiarska's opinion, they are differentiated according to the type of recipients, scope, the degree of details and their frequency (2016).

As far as fulfillment of the information needs by other users of reporting drawn by communes is concerned, A. Adamek-Hyska (2013) claimed that they should have the form of a non-uniform report. Thus, the commune authorities should adapt the reporting model and management tools in such a way to make it possible to fulfill their needs. The current regulations concerning reporting of communes do not require their entities to implement the tools of management accounting facilitating the process of making decisions and the evaluation of the achievements. It proves that accounting of basic units of the territorial government and their reporting is focused mainly on the fulfillment of the legal duties, which fully fulfill only the needs of government agendas for control and statistics purposes. It is one of the most important dysfunctions of the existing reporting (Wakula, 2015).

Shortage of information reporting made by units of the territorial government was noticed by the research carried out by other authors (Filipiak, 2009, Walińska, Bek-Gaik, Rymkiewicz, 2015). They advised aiming at improving the structure and information content of reporting to fulfill the needs of various stakeholders. Z. Firkowska-Jakobsze (2017) did not agree with the view presented by K. Winiarska (2016) that financial reports of units of the sector of the public finance were the source of data necessary to make financial decisions contributing to the optimal management of the public financial means and to the achievement of the best results from particular expenditure. It resulted from the fact that the aim of making each financial report by any unit is mainly to provide their recipients with information concerning economic and financial processes taking place in a given economic unit that may influence their material position and financial economy as well as may be the basis for making decisions in a wider scope.

Another barrier negatively influencing the full use of budgetary reporting for management purposes is the cash basis applied in the accounting of units of the territorial government. The cash method of reporting economic operations does not include numerous economic events. The consequence is the fact that reporting lacks events and economic processes which are not connected with a direct cash method. It should also be emphasized that budgetary reporting includes means which has not been credited to the budget bank account, for instance, shares in tax which are the income of the state budget. However, the information does not include means which are on the bank account of a unit and concern the following year (for example, a January rate of the general education subsidy) (Filipiak, 2009). Effective management of a unit of the territorial government and the proper evaluation of the financial situation may interrupt the statutory deadlines of making budgetary reports. It leads to the delay in terms of presenting the state of realization of the budget processes which take place during the implementation of the budget. The dysfunction of the budget reporting is lack of financial stability between particular periods. It results from the fact that territorial governments do not make reports concerning cash flows. Units of the local governments do not have such a possibility to evaluate the real influence of liabilities on their financial situation. The current liability account classifies credits, loans and securities as debt omitting unmatured liabilities.

3. Research results

The communes of Siedlce subregion and Ostrołęka subregion. The choice of the area was dictated by their specifics. They are part of the Masovian province described as the voivodship of the greatest contrasts. General indicators calculated for the whole province do not reflect the real situation in the studied subregions. To characterise the studied subregions, the following features were selected:

- Total income in PLN per capita,

- The number of economic entities
- The number of inhabitants,
- Population per km²
- The area in km²

Analyses on the basis of the above features were conducted using standard measurement: minimal and maximal value, the median, variation coefficient. The results are presented in Table 1.

Table 1. Characteristics of the studied communes.

Characteristics	N	Me	Min	Max	V
Total income in PLN per capita	88	4294,40	3630,22	6660,16	9,6%
The number of economic entities	88	622	194	7801	115,1%
The number of inhabitants	88	5276	1679	22656	61%
Population per km ²	88	40	19	1071	201,6%
The area in km ²	88	119	10	371	45,6%

Source: Own elaboration on the basis of the data from Local Data Bank

On the basis of the data presented in Table 1, it is possible to state that half of the studied units achieve income per capita at 4294,40 PLN and lower. The lowest income per capita amounted to 3630,22 PLN and the highest - 6660,19 PLN. The lowest number of economic entities in a commune was 194 and the highest -7801. Half of the studied communes have at least 5276 inhabitants. Maximal number of inhabitants in one of the studied communes amounted to 22656. The lower area of the commune in Siedlce subregion and Ostrołęka subregion is 10 km².

While evaluating diversity of the presented characteristics in the studied communes using the coefficient of variance for measures of location, we can state that nonuniform features of the analysed communes include: population per 1 km² 201,6%, the number of economic entities 115,1%, the number of inhabitants 61% and the area in km² 45,6%.

The conducted research was addressed to heads of communes, treasurers and secretaries. It aimed at getting to know the applied methods and accounting tools implemented to increase the efficiency of managing available resources. 89 surveys were conducted and the responses were provided by 15 secretaries and 73 treasurers (only in one commune, it was possible to carry out a survey both with the secretary and the treasurer). Heads of the communes, when asked to answer the questions in the survey, delegated the task to secretaries pointing at their competence.

The respondents were first asked about the development of their professional careers. On the basis of the research, it can be stated that 86 % of the secretaries worked in the public sector at the beginning of their careers, the others started their professional path in the private sector. Analysing work experience of the secretaries, it can be pointed out that 67% of them were connected with the public sector at the beginning of the career. The other 33% worked in the private sector before the started work in communes. It may have an influence on the process of dissemination of solutions and tools from the private sector to the public one.

The practice of accounting and the applied method of accounts have a significant influence on information values of reporting. The studied units of the territorial government apply the cash basis (75% of the analysed units). Due to the fact that the method is widely criticised, the conducted research made an attempt to examine the opinion of

the respondents concerning the cash basis. The results were quite surprising. Only 9% of the respondents noticed the necessity to shift to the cash method to improve the quality of information generated by the accounting system. It confirmed the thesis which was mentioned in the theoretical part of the article that employees of the local government were resistant to any changes and were not aware of the importance of information derived from the reports. 51% of the respondents claimed that changes in the classification structure were the main element aiming at the improvement of the accounting system. The current budgetary classification does not require to calculate indirect costs. Due to that, no attention is paid to the areas where costs occur and, as a consequence, there is no possibility to calculate real costs concerning the particular cost object.

While analysing the research concerning the possibilities of using financial reporting in making decisions, 72% of the respondents stated that the existing system provided a wide range of information necessary for the management. The results of the study did not confirm the thesis indicated in the introduction. Such a distribution of responses may be caused by the fact that the answers were given only by treasurers who also had access to other data that could be used while making decisions. It may lead to the conclusion that current reporting needs changes which would enable the use of this additional information that are used by budget accountants. Despite the fact that almost three-quarters of the respondents claimed that the existing system of accounting and reporting was fully functional, there were still 23% who admitted to making additional reports, different from those obligatory. It confirmed the fact that the existing reporting system did not appeal to them fully. An interesting fact was mentioned by 12% of the respondents. They claimed that the reporting system of the communes gave them limited possibilities of providing information used while making decisions. It was a very significant postulate as it showed the need to introduce changes for the purpose of fulfilling the needs of the studied communes. While analysing the responses to the studied question in comparison with the career development report, it can be stated that 68% of the respondents who claimed that the current reporting did not fulfill their information needs worked in the private sector earlier. The results of the analyses conducted by the author were completely different from the ones achieved by B. Filipiak (2009). In the quoted research, only 39,3% of the respondents thought that existing reporting provided full scope of information essential in the process of making decisions.

The main goal of the reporting in the studied communes was fulfilling legal duties (99%). As many as 68% of the respondents made reports for management purposes, whereas 75% did it to fulfill the needs of banks, other territorial governments and inhabitants. Only 8% of the surveyed people claimed that the main beneficiaries are the inhabitants and 20% pointed out banks. Others mentioned Regional Chamber of Audits, Statistics Poland, the Marshal Office and the Ministry of Finance as the beneficiaries. According to the respondents, the main faults concerning the reporting included:

- lack of comparability resulting from frequent changes in the legislation (74%)
- lack of inclusion of events and economic processes that are not directly connected in the cash method of accounting (20%)
- lack of information on the costs (9%)

It is a very worrying fact that only 9% of the respondents claimed that the existing reporting lacked information on costs. It is significant as far as conducting rational financial economy and efficient management are concerned. To obtain such information, it would be necessary to broaden the existing scope of costs records.

As many as 54 units apply only and solely accounts under group 4 for cost records. In 17 communes, budget accounting is carried out only from the perspective of budget reporting, and in 3 of them, the secretaries could not determine the way of cost records. Despite the fact that it is obligatory to draw up a profit-and-loss account in a comparative form, the legislator does not forbid to record costs in a functional way. The Ordinance of the Minister of Development and Finance of 13 September 2017 on accounting and plans for accounts of the state

budget, budgets of units of the local self-government, budget entities, local budgetary entities, state-run specific purpose funds as well as public budgetary entities established outside the territory of the Republic of Poland provides a list of accounts 5, which enable costs to be grouped according to place of their incurrence, which in turn makes calculating costs easier. 36 communes of Siedlce subregion and Ostrołęka subregion apply costs which are recognized by nature and by function. None of the analysed units uses only the 'by function' model. The result is alarming and means that only 35% of the studied communes apply multi sectional cost record. It also confirms the fact that very few respondents are aware of the information capacity of the record. Comparing the results of the research conducted by B. Filipik in 2009, it is necessary to emphasize that the awareness of the significance of the information has been growing over the years. The analyses mentioned above show that only 3,8% of the units of the local self-government took into account the division of costs into types of the conducted activity.

4. A suggestion of changes in the cost records of unit of the territorial government

As it was mentioned above, the information on costs has a basic meaning while making decisions concerning the functioning of an economic unit. To achieve full and reliable information on the deliberate use of resources in a commune, it would be essential to develop systems of the records of costs. This part of the elaboration deals with 3 aspects of accounting solutions which may help to adjust accounting systems. The following models may be suggested:

- Cost accounting by cost nature with detailed task accounts,
- Cost accounting by responsibility centers (according to the places where the costs occur)
- Cost accounting both by cost nature and by cost function.

Cost accounting by cost nature is based on the following cost accounts: depreciation, material and energy consumption, third-party services, taxes and charges, remuneration, social security and other contributions as well as other expenses by nature.

Detailed accounting in the team is conducted according to the classification points of the financial plan and in cross-sections adjusted to the planning needs, analyses and in such a way to make it possible to draw up a financial statement.

To obtain information concerning costs of performing a particular budget task, it would be essential to introduce an additional analysis enabling recording costs for particular tasks. The advantages of the suggested model include:

- The possibility to use already defined billing accounts for the needs of recording costs in cross-sections connected with performing budget tasks.
- Providing consistence of recording costs in budget classification and task classification.
- The possibility of multitask analysis. The solution enables us to collect information concerning budget tasks and provides data on budget classification according to which a particular budget task is performed and costs involved in it.

The flaw of the solution, however, is the increase in the number of accounting records. It is caused by the fact that current accounting records made by details connected with budget classification must be additionally fragmented into particular budget tasks.

While analysing such cost records in a particular unit of a territorial government, the following example may be used:

A unit of the territorial government analyses a specific budget task. The comparison of two budget periods shows that task costs increased by 22% with the same scope of provided services. The answer why something like that occurred would be difficult without the comparison of task costs and costs recorded by nature. Conducting records according to the suggested model gives the possibility to conduct the analysis of particular budget tasks

in terms of costs influencing a given task. Assuming that fulfilling a task requires the following costs: remuneration of the employees, social security and other benefits to the employees, third-party services as well as taxes and charges. The comparative analysis indicated that all the costs except for taxes and charges increased by 3%, whereas costs connected with perpetual usufruct charges (classified as taxes and charges) went up by 35% as a result of updating the annual fee. The table 2 illustrates it:

Table 2. Costs of the fulfillment of the budget task in a particular unit of the territorial government

Task costs	Level		Dynamics 2017=100
	Years		
	2017	2018	
Remuneration	183000	188490	103
Social security and benefits to the employees	36600	37698	103
Third-party services	1800	1854	103
Taxes and charges	366000	494100	135
Total	587400	722142	122

Source: Own elaboration

Owing to such information, the head of a unit of the territorial government has knowledge on the factors shaping the level of costs of the performed tasks and on the basis of it, they can make management decisions.

Another suggested method of costs records aiming at a full and reliable information used in managing a basic unit of the territorial government is cost accounting by responsibility centres, which is according to the places where they occurred. The places of occurrence of costs in a commune are regarded as identified sectors of the unit activities for which costs are recorded, such as branches, departments or organizational entities of a commune conducting particular budget tasks. The benefits of such a system of recording the consumption of targeted resources include:

- the possibility to analyse the unit activity in terms of costs produced by particular areas. It provides the management with information on the most costly areas of the unit activity. Without such a separation, the only information provided would be on the general level of costs incurred. However, it would not give the answer to the question on which areas of the activity required costs are most significant and where restructuring measures need to be introduced.
- It considerably allows cost allocation to particular budget tasks. The cost allocation means assigning expenses to particular budget tasks. It occurs when the common costs are generated, the ones which concern many tasks and which are essential to fulfill the task.
- The possibility to compare particular sectors in terms of cost carriers.

The usefulness of the model of cost records will be presented using the following example.

Due to a lack of full financing of a unit in the following budget year, the head of the unit decided to make a decision to restructure the costs. The costs in the given unit looked as follows (Table 3):

Table 3. The cost level connected with the fulfillment of the budget task

Costs of the task	Level	Cost share [%]
	Year	
	2018	
Remuneration	4 500 000	72,8
Social security and benefits to the employees	900 000	14,5
Third-party services	700 000	11,4
Taxes and charges	80 000	1,3
TOTAL	6 180 000	100

Source: Own elaboration

On the basis of the data in the table, it can be stated that the most significant costs in the analysed commune are the ones connected with the employment. Remunerations and social security altogether make up 87,3% of the costs of fulfilling a budget task. The attempts concerning restructuring costs connected with third-party services or taxes and charges surely won't be sufficient due to their little significance in total costs. The head of the unit will have no choice but to take measures to lower the employment costs. To be able to do it properly, the head of the unit should support his / her decision with the analysis of remuneration costs in particular organizational bodies.

Table 4. Costs of remunerations connected with fulfilling a budget task in particular organisational bodies of a unit of the territorial government.

Costs	Year	Department A	Department B	Department C	Department D	Department E
	2018					
Remuneration	4 500 000	900000	1200000	400000	1400000	600000
Benefits to the employees	900 000	180000	240000	80000	280000	120000
Total	5400000	1080000	1440000	480000	1680000	720000
The share of places of cost occurrence in total costs [%]	100	20	26,7	8,8	31,2	13,3

Source: Own elaboration

The data included in the table 4 indicate the Body B and Body D are the most costly organizational units as they generate 51% of remuneration and derivatives in total. Due to that, it would be necessary to analyse employment in the areas. The action will bring the fastest financial effect. Without a detailed cost records concerning the places of their occurrence, the quality of information will definitely make it harder to make decisions.

The example presented above showed the analysis of the most significant areas in a unit as far as generating costs is concerned. Owing to the application of cost recording according to the places of their occurrence, it is possible to calculate costs of employment of a person. Without such a way of recording costs, it would not be possible. It is illustrated by the Table 5 below.

Table 5. Cost of employment of one person in a given organisational body.

Costs	Year	Department A	Department B	Department C	Department D	Department E
	2018					
Remuneration	4 500 000	900000	1200000	400000	1400000	600000
Benefits to the employees	900 000	180000	240000	80000	280000	120000
Total	5400000	1080000	1440000	480000	1680000	720000
Employment calculated as full-time contracts	128	20	36	12	43	17
Average cost per one employee	42187,5	54000	40000	40000	39069,8	42352,9
Average cost per one month	3515,6	4500	3333,3	3333,3	3255,8	3529,4

Source: Own elaboration

The analysed system of cost recording is connected with determining the centers of cost responsibilities. Cost recording according to particular organizational bodies may be linked with determining responsibility for the costs generated on a given area. After the introduction of responsibility connected with a relevant motivation system, it is possible to achieve results in a form of cost savings or an increased effectiveness.

Another model of cost recording, which will influence the quality of making decisions in units of territorial government, may be the one based on cost accounting by cost nature (Group 4) and by cost function (Group 5). Group 5 deals with records and the settlement of costs by function. Accounts of the group should be applied in such a case in which the character and the scope of the activity or organization of the unit require the determination of the structure of costs for particular types and kinds of its activity. The group includes such accounts as: normal business expenditure, auxiliary activity costs, management costs and the settlement of the activity costs.

Conclusions

The theoretical elaboration conducted above confirmed the fact that there are numerous dysfunctions existing in the current accounting and reporting applied in the units of territorial self-government. The main one is the cash basis. While using the method, it is not possible to receive reliable information concerning the budget balance and complete information on costs. The cash method does not induce users to manage the available resources effectively. On the international arena, it is postulated to shift from the cash basis into the accrual method. Polish communes, however, often face numerous obstacles. It was confirmed by the research conducted in communes of Siedlce subregion and Ostrołęka subregion. Only 9% of the respondents noticed the need of change from the cash basis into the accrual method of reporting, whereas as many as 74% claimed that the existing form of reporting is sufficient to make appropriate decisions. It is worrying that only 9% of the respondents pointed out lack of information of the consumed resources as the main flaw of the reporting.

The results of the conducted research may indicate that commune management uses information from the accounting system in a limited degree while managing a commune. It is concentrated only and solely on the control of the limits concerning budget expenditure. Lack of classification of expenses by function may indicate that a detailed calculation of the performed services and realized public tasks is not conducted.

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Monika WAKUŁA Ph.D, assistant professor in the Department of Management and Quality Sciences of Siedlce University of Natural Sciences and Humanities. Scientific interests: accounting and reporting of units of territorial self-government, managing finance of a commune

ORCID ID: orcid.org/0000-0001-9896-7997

Register for an ORCID ID:

<https://orcid.org/register>

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AN ECONOMIC ANALYSIS OF AGRICULTURAL PRODUCTION FUNCTION ON THE PADDY FIELDS OF THAILAND

Sudawan Somjai ¹, Thitinan Chankoson ², Kittisak Jermisittiparsert ^{3*}

¹ Graduate School, Suan Sunandha Rajabhat University, Bangkok, Thailand

² Faculty of Business Administration for Society, Srinakharinwirot University, Bangkok, Thailand

³ Contemporary Peasant Society Research Unit, Social Research Institute, Chulalongkorn University, Bangkok, Thailand

E-mails: ¹sudawan.so@ssru.ac.th ; ²thitinanc@swu.ac.th ; ^{3*}kittisak.j@chula.ac.th (Corresponding author)

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Abstract. This research study is based on analyzing the variables, which assess the Thailand's paddy production. Similarly, the TFP in Thailand's paddy production can be determined through these factors. Moreover, the substitution elasticity between capital and labor has been measured in this research. Further, the substitution elasticity between the older and young farmers has been tried to be investigated. It is expected that the results of research would offer suitable suggestions for policy makers to improve the level of paddy sub-sector productivity in Thailand. In this study, the first objective is based on analyzing the factors, which assess the paddy production with reference to Thailand. Cobb-Douglas production function has been used in this study. Moreover, the stand error and coefficient of determination have been used to assess the regressors, which are significant. The study has used production function to formulate the problem. The findings of the study have revealed the fact that A crucial role is played by productivity in improving the paddy production of country. Therefore, there is need for determining the level of paddy production to be sufficient (high enough) or insufficient. Productivity can be measured in different ways. The measurement of productivity is based on the type of information of the productivity available.

Keywords: agricultural production; production function; Thailand

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JEL Classifications: Q10, Q13

1. Background

Apart from being a staple food and a source of calorie, paddy sub-sector is vital in influencing the Thailand political environment. In the Thai political perspective, the government has formulated several policies involving subsidies and incentives, a target of 10-tonne productions per-hectare programme and paddy mini-estate. All of the above policies are tools to achieve multi-racial unity in Thailand, which will be achieved if the government can reduce poverty and income gap between agricultural (paddy farmers) and non-agricultural sectors. Thus, through unity, Thailand can create political stability and a stable government which promotes national development (Jermisittiparsert, Sriyakul, & Pamornmast, 2012; Jermisittiparsert, Sriyakul, & Rodoonsong, 2013; Sriyakul & Jermisittiparsert, 2017)

In addition, in 2009, this sector also provided employment opportunities to 316,000 Thai farmers (Fahmi, Samah, & Abdullah, 2013). There were about 116,000 full-time farmers who have made this sector as the main source of income. Meanwhile, there were more than 200,000 paddy farmers that have made this sector as the second source of income (Fahmi et al., 2013; Fatah & Cramon-Taubadel, 2017). Apart from providing employment opportunities, this sector also becomes a source of income for farmers. However, the total incomes earned by paddy farmers are relatively low, which has contributed to the high rate of rural poverty. In 1980, the rural poverty rate was about 37.4 per cent. Approximately 73 per cent of the rural poverty is contributed by paddy farmers. Most of these farmers have an average monthly income of less than RM1,500 per month (Kamaruddin, Ali, & Saad, 2013). However, in 2009, the rural poverty rate has decreased to 8.4 per cent. To some extent, this shows that there is an improvement in the rural poverty rate in Thailand. Nevertheless, in 2009, the rural poverty rate (8.4 per cent) was still high compared to the urban poverty rate (1.7 per cent). A majority of the poor people in rural areas are associated to the paddy farming (Fahmi et al., 2013). For THAILAND, the total poverty rate was recorded about 1.4 per cent out of the amount, which is 1 per cent under hard-core poor. If we assume that the poverty rate for all granary and nongranary areas 4 equals to 1.4 per cent, therefore, the total poverty rate in paddy sub-sector exceeds 11 per cent. Overall in Thailand the paddy production (Figure 1).

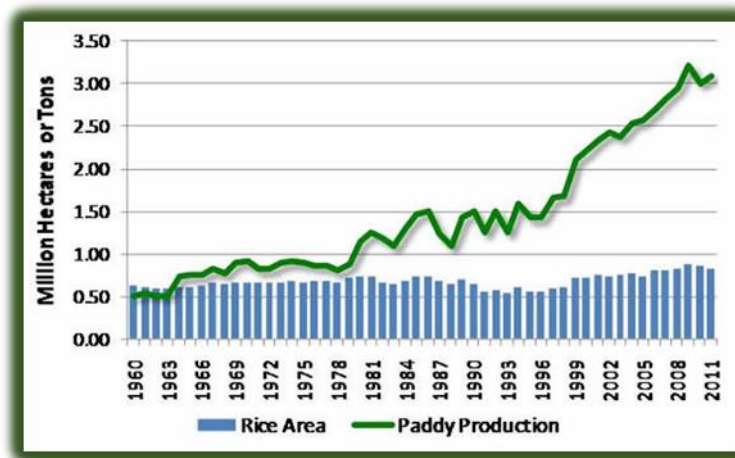


Figure 1. Paddy production in Thailand

Source: USDA

As mentioned by Zhou and Liu (2019) and Ligon and Sadoulet (2018), poverty has a positive relationship with a total production. Therefore, it is assumed that 11 per cent poverty will cause a large fall in production. Even globally the paddy production during current decade has increased significantly (Figure 2).



Figure 2. Global paddy production and area

Source: Food and agriculture association of United Nations

Among the identified factors that contribute to the high poverty rate is the age factor. On the average, the farmers' age that is involved in paddy farming is more than 60 years. At this age, farmers are no longer effective to execute any physical works in paddy fields. This has contributed to the low level of productivity in the paddy subsector. Another factor that has contributed to higher poverty rate is the low level of education among paddy farmers. Low education levels contributed to paddy farmers with the problems in obtaining lucrative income from the farming activities (Moyo, Francis, & Bessong, 2018). Several studies have shown that the economic situation has a direct relationship with a poverty rate Zhou and Liu (2019). This is because the economic growth will reduce poverty rates whereas the economic slowdown will lead to the increase of farmers' poverty rates. This is true for the Thailand case in which we cannot reduce poverty rates especially those of farmers' poverty when they were paired with economic slowdown in 1997. Various policies and programmes have been carried out by the government to ensure farmers get high returns from paddy-farming activities. These directly affect the farmers' income level and, perhaps, could drive them out of continuous poverty. However, the government has also needed to ensure that the prices paid by rice consumers are at the affordable level (Sinha & Sheth, 2018). Basically, all the government's paddy-and-rice policies are to make sure that Self Sufficiency Level (SSL) for rice increases and are enough to meet the local rice demand. Additionally, the important objective in every policy and programme is to increase farmers' productivity. This is because when farmers' productivity increases, their income would also increase. This will enable the country to achieve rice self-sufficiency rate (Sinha & Sheth, 2018).

The productivity has to be increased by the farmers for increasing the production of paddy. A crucial role is played by the improvement in level of productivity in increasing the paddy production of a country (Jones, 2018). For increasing the paddy production in an effective manner, there is need for exploring the variables, which significantly affect the level of production. The efficiency of every input can be measured through the information of production input. After the determination of the significant input of production of paddy, the TFP (total factor productivity) can proceed. Technological and labor progress is linked with the TFP (total factor productivity). It is crucial to determine the substitution elasticity between the technological progress and labor input. The production can be determined as labor or capital intensive with the estimate of substitution elasticity in the paddy production. Moreover, different farmers' age can be included in paddy production. It is critical to assess the substitution elasticity between the old and young farmers. The farmer's productivity increases as per this finding. The TFP sub sector of paddy is indirectly increased with the increase in farmers' productivity.

By using the approach of production function, the TFP can be measured systematically (Jones, 2018). This research study is based on analyzing the variables, which assess the Thailand's paddy production. Similarly, the TFP in Thailand's paddy production can be determined through these factors. Moreover, the substitution elasticity between capital and labor has been measured in this research. Further, the substitution elasticity between the older and young farmers has been tried to be investigated. It is expected that the results of research would offer suitable suggestions for policy makers to improve the level of paddy sub-sector productivity in Thailand. In this study, the first objective is based on analyzing the factors, which assess the paddy production with reference to Thailand. Cobb-Douglas production function has been used in this study. Moreover, the stand error and coefficient of determination have been used to assess the regressors, which are significant.

The second objective in this research is to analyze the growth of TFP in paddy sub sector of Thailand. Cobb-Douglas production function is the common function employed for the determination of TFP. The TFP value can be calculated as the residual between the values added and growth as per the given data on capital and labor input and shared values. The third objective of the study is to measure the substitution elasticity between capital and labor, old and young farmers in the production of paddy. There are several implications of determining the substitution elasticity in the production of paddy. It can be used relative to the capital and labor employed in the process of production. The fourth objective of the study is to analyze the substitution elasticity between the old and young farmers in the production of paddy.

The farmers and policy makers can find this study useful. The study creates and influence in the form of micro as well as macro planning by the top management. The inter-government agencies are involved in the macro planning and the policies are formulated by the policy makers. At the same time, the farmers' mobilization at the level of production is involved in the micro planning. These policies should be implemented by the government in specific actions taken at the level of farm. The actual production takes place at the level of farm. An indirect influence can be obtained by the farmers through different policies, which can be introduced by the government.

2. Literature review

The sector of agriculture is an ancient sector of economy all over the world. It has great significance for the social, economic, and political development in almost every country. The history of developments in agriculture has given some unique experience to every developing country. This is distinct for every emerging country, but every country has similar characteristics for the development of agriculture. The share of agriculture sector in majority of the countries is declining. In this way, the contribution of agriculture sector declines in the economic growth and this makes it the third engine. However, its contributions are still significant in the economic development.

The agriculture sector in the emerging economies is not performing optimally. Most of the farmers are working at a small scale, which make their contributions limited. The activities of agriculture are carried out in the form of subsistence and traditional. For this, the investments on agriculture give low returns. Moreover, the family size of the farmers is mostly large, and their income is below the line of poverty. They are not able to support their family in terms of finance. This makes them live in a miserable condition. They are influenced to live in the hard-core poverty. Some researchers have signified these circumstances (Caiazza et al., 2016; Thompson, 2018). These researchers have claimed that same characteristics are shared by the small-scale farmers in the emerging economies including less productivity, inefficiency, and poverty. Usually, the yield is obtained for consumption of family. The surplus is sold. In this way, income earned by the farmers becomes low and this creates an influence in their savings. Resultantly, difficulties are faced by the small-scale farmers in investing and purchasing the quality seeds, machines, and fertilizers. Because of these reasons, the small-scale farmers are facing debt situation in the emerging economies (Ligon & Sadoulet, 2018). For the strategy formulation to increase the income level of small-scale farmers, several empirical studies have been carried out. It has been suggested by researchers that there is need for improving the quality of life of small-scale farmers particularly in the emerging economies. In order to resolve this issue, it has been suggested to commercialize and re-structure human capital in the sector to make agriculture system systematic.

The training centers of agriculture should be facilitated with modern equipment and laboratories. In this way, skilled human capital can be produced for agriculture sector. The grade, production, and quality of products in the agriculture sector can be improved. The prices of the products will be competitive as well. The efforts are not precise and certain challenges exist in the way. The local communities may resist the change. Several people consider the agriculture field as a third-class job and are not involved in it. Among these people, most are the young people. Because of this perception, unemployment has increased in the rural areas. Moreover, there are several job opportunities in the urban region, which influence young people to migrate there for the sake of employment. The job opportunities in the cities are filled by the young's influx. The unemployment rate among the youngsters is tried to be reduced by these circumstances. The rate of unemployment in the urban region is not more than 10 percent yearly (Giannakis & Bruggeman, 2015; Wharton, 2017).

The economies of dualism are still being practiced by the developing countries. It shows that both the modern and traditional sectors exist altogether and have some major contributions in the growth of economy. There is more capital employed in the industrial sector and skilled labor is required. There are several unskilled people in the agriculture sector, and they are dependent on the traditional techniques of agriculture. The modern techniques are employed by the farmers who work at large scale. Therefore, they enjoy greater returns as well.

2.1 Agricultural and Economic Development

In the essay "An Inquiry into the Nature and Causes of the Wealth Nations", Adam Smith detailed the causes and determining factors of economic growth. He presumed that the level of market size limits the labor division, which helps in understanding the concept of wealth creation. Entrepreneurship is influenced to innovate because of the market size development. The specialized labor is created through major capital investments. Adam Smith claims that this can increase the labor productivity. The capital accumulation, economic development, and savings can be increased (Lucas & Fuller, 2017).

The problems of economic development have also been discussed by the classical economists such as Stuart Mill, Ricardo, and Malthus. For instance, in the famous book *The Principles of Political Economy and Taxation*, Ricardo claimed that the most dominant sector of a country is agriculture sector. The book was published in 1817. The people were classified as

investors, capitalists, and labors. It was also stated that land is a scare factor and competition exists over its utilization (Lucas & Fuller, 2017). The land comes under competition for being used in agriculture or industry. Ricardo in his book said that there come changes in technology with the passage of time. The economic growth can occur rapidly because of the changing in the technological level. Moreover, the stationary state can be avoided by the technological changes. Therefore, the economic development can be enhanced by the changes in technology. It was added by Ricardo that agricultural development is based on labor. The wage rate paid to the labor determines their continuity for working in the agricultural sector. The minimum level of wage determines the increase or decrease in the labor force. When the owners receive rate of return, which is higher than the minimum benefit received, this results in accumulation. In this way, investors are attracted to invest their money for getting higher returns. There can be decline in the marginal product with the increase in employment in a limited area of land. To resolve this issue, it has been suggested by Ricardo that technology can be used and capital should be accumulated. The productivity of labor increased with this accumulation. Marx also argued the concept of capital accumulation for economic growth. This was later discussed by Domar, Kaldor, and Harrod, being the members of neo Keynesian and neo classical economics. It was thought by neo-Keynesian and neo-classical economics that the agricultural productivity can be increased by savings.

Therefore, it must be ensured that investment should be made in the industrial and agriculture sector. It has been suggested by Schumpeter that some internal agents promote the development that can result in a new set of factors of production. These were named as entrepreneurs by Schumpeter. Similarly, the process of development happens when the ideas of employers are supported with the talent of entrepreneurs. The development process is supported by different factors and infrastructures such as finances and physical provisions.

There is a key role of agriculture sector in the economy particularly in the initial development stages as per the perspective of economic development (Awokuse & Xie, 2015; Inam & Effiong, 2017; Vigliarolo, 2020).

A large surplus is produced by the agriculture sector that is necessary for economic transformation. Alternatively, this role is not performance by the non-agriculture sector because of their small size. Therefore, these limitations should be overcome by the agriculture sector in the emerging economies. The non-agriculture sectors cannot progress until these challenges and obstacles are overcome.

Higher wages for the employees can be the result of improvements in the non-agriculture sectors. This makes them able to spend more on necessities such as food and clothing. Resultantly, the demand for food can increase. The food supply is inelastic that reflects that it cannot change with the change in price. When the demand increases for food, this can shift the prices of food products. A negative influence is incurred on the society with the increase in the food prices. This problem can be solved through imports. This can be an expensive solution due to financial constraints. The economic transformation can be encouraged by the changes in the agriculture sector (Sender, 2016). A crucial role is played by agriculture sector in the initial stages of transformation of economy. This occurs in various ways. The income and resident's welfare may increase because of growth in the agriculture sector in the respective economies. This makes them able to raise demand for the food products and other services developed by the non-agricultural sectors (Rehman, Chandio, & Jingdong, 2017).

The development of industry based on agro is encouraged with the improvements in the agriculture sector. The growth of agro-based industry is dependent on the downstream sectors such as textiles, fuel, beverages, food, and machines. The industry based on agro is crucial as it can offer input of production for industries including pesticides, agricultural machinery, and fertilizers (Wiggins, Sabates-Wheeler, & Yaro, 2018). Infrastructure increased with the development of agro based industry in the rural and urban regions, which is supported by the government.

2.2 Developments in Production Function Analysis

Production function is an important economic analysis tool which has evolved over time. There are two school of thoughts regarding the production function's pioneers, where one views Philip Wicksteed as the pioneer of production function while other states Johann von Thunen as the first pioneer. Production concept refers to skillfully arranging the acquired knowledge and does not act as a tool for representing consequences of the economic choices. Rather, it acts as a tool for obtaining an entity which could affect the economic decision-making.

Economic efficiency is the main area of concern which often get highlighted while analyzing the production function. The researchers (Chukwuji, Inoni, & Oyaide, 2006; Leibenstein, 1966) suggested that economic efficiency is of two types, namely; resource allocative efficiencies and technical efficiencies. The term efficiency relates to the knowledge engineering. Although several empirical researchers assume that production functions do not involve any managerial, technical and engineering efficiencies. Assuming this, several previous researches (Chukwuji et al., 2006) have particularly focused upon the allocative efficiency of resources which presents an ideal combination of resource and technical allocation efficiencies.

Generally, a physical relation exists among input and output, such as one machine and one labor combination will produce many output units. The literature frequently uses financial values for indicating input-output relationship. A few studies have also shown the use of different physical units for measuring the input-output relationship. It may cause certain problems while performing the empirical analysis, involving undivided units. However, there is another opinion by Faber, Proops, and Baumgärtner (1998), that production process means producing various number of outputs. Therefore, a weighted price can be observed to consider the difference in products. Thus, the wastage and error involved in the physical production process can be isolated.

It has often been assumed by researchers that the technical efficiency issues of a firm can be resolved through the production function, but in fact it is a false proposition because for each variable different measuring unit is used. Apart from this, production function must not be taken as a business model, since it ignores several cost and management aspects. Thus, to avoid such problems, a non-parametric approach i.e. Data Envelopment Analysis (DEA) was suggested by several researchers (Angelidis & Lyrودي, 2006; Banker, Charnes, & Cooper, 1984). According to Emrouznejad and Thanassoulis (2001), the DEA approach can measure multiple input-output analyses and does not involve mathematical forms in its production function.

Knut Wicksell is the pioneer of developing algebraic hypothesis into physical agricultural production functions, in agricultural economics field. He reported positive increasing returns on labor and capital when applied to infertile soil. Based on this hypothesis, he explained that the quality and quantity of inputs determine the size and growth of agricultural output. In Knut Wicksell's view, the input-output relationship can be demonstrated in mathematical form. Thus, for a certain period of time, if X_1 , X_2 , and X_3 are the inputs and P denotes the total output, then production function can be presented as follows:

$$PR_t = f(X_1, X_2, X_3) \dots \dots \dots (1)$$

Tough, Wicksell was the key person who has formulated a basic production function, the first empirical estimation which was performed by Cobb and Douglas (1928). The production function was later known as Cobb-Douglas Production Functions (CD). The origin of certain functions can be traced back to the work of Wicksell.

$$PR_t = f(X_1^\alpha, X_2^\beta, X_3^\gamma) \dots \dots \dots (2)$$

According to Wicksell, the coefficient for Equation 2 above can be unity and have a constant return to scale. In Charles W. Cobb's and Paul H. Douglas's study, a similar production function was used by them as proposed by Wicksell. They used the data on the U.S. manufacturing industries from 1899- 1922. Cobb's and Douglas's work was the first empirical work using time-series data. Generally, the form of production function is as follows:

$$PR_t = bL^k C^{1-k} \dots \dots \dots (3)$$

where P is output, L is labour and C is capital input in the industry. The estimation was resulted from the production function model which used by Charles W. Cobb and Paul H. Douglas, as follows:

$$PR_t = 1.0L^{0.75} C^{0.25} \dots \dots \dots (4)$$

From Equation 4 above, Cobb and Douglas (1928) have indicated that a combination among labour and capital coefficients equals to one. They also indicated constant returns to scale. This finding has confirmed the Wicksell's earlier hypothesis. If the coefficient is greater or lesser than one, then the total product may be larger or smaller than the number of combinations of input used. Therefore, we can identify whether the firms enjoy an increasing or decreasing marginal productivity. In another study, Cobb and Douglas (1928) have stressed on the unitary degree of elasticity or the amount of elasticity of resources which are equivalent to one. They have employed the function, $PR_t = bL^j C^{1-k}$ where the coefficient j and k can take a non-zero value. The Cobb-Douglas's production function has become popular until today. This is because the Cobb-Douglas's production functions are the simplest production function. After the development of a production function that was highlighted by Cobb and Douglas (1928), the study of the production function became popular among numerous researchers (Fraser, 2002). There are various forms of estimation which can be carried out by using the production functions. The study of production function can be broken down into several types of data, such as the cross-sectional, time series, and panel data.

In addition, there are also some other alternatives of the production function which is essentially used in empirical estimation. Among them are Constant Elasticity of Substitution (CES), Variable Elasticity of Substitution (VES), and translog and other flexible production functions (Christensen, Jorgenson, & Lau, 1973; Lu & Fletcher, 1968).

2.3 Single Output Production Functions

The production function knowledge has grown enormously since 1970s. During this period, the development of the knowledge has brought a number of prominent scholars. Among them were Turgot, Johann von Thunen, Philip Wicksteed, Malthus, Cobb and Douglas (Hussain et al., 2019). Since then, the production-function development has been a crucial tool in empirical analysis in all economic schools of doctrine. Returning to the historical development of the production functions, many scholars believed that Turgot was the first scholar to have introduced the production functions knowledge around 1767. According to Schumpeter (1954), Turgot has argued how the dissimilarity in factor proportions affects the marginal productivity of production. Based upon Turgot's observations, the utility of consumption of one product may reduce if the supply of the product increases. The increase in quantity of production input may increase the productivity up to a maximum point. After this point, the increasing in the unit of input used may decrease the marginal productivity level to zero. Eventually, if there are more input units added, the productivity may turn to negative. Consequently, after a maximum point, additional input may be unproductive. Subsequently, more than thirty years after Turgot, the production functions knowledge has evolved. Several scholars have successfully connected to this development such as Johann von Thunen and Philip Wicksteed (Mishra, 2007). The numerical concept of the production functions has been introduced by Malthus. Towards this, Malthus introduced the logarithmic production function in 1798. The idea of logarithmic production functions is to capture the law of diminishing returns. To facilitate the description of his model, Malthus specified that the population increases by the geometric ratio (1, 2, 4, 8, 16, 32...) while land increases the arithmetic ratio (1, 2, 3, 4, 5...). Malthus has then presumed that labour may experience diminishing returns when combined with land.

Following Malthus, David Ricardo introduced the idea of a quadratic production function in 1817. According to Ricardo, the growth may stop when diminishing return of capital is combined with limited land. At this point, the investment may drop. This is because the economic growth may have reached the stationary phase. After Malthus and Ricardo, Johann von Thunen has introduced the exponential production function. In fact, he was the first person to have used this function. Von Thunen exponential production function can be written as follows (Mishra, 2007):

$$PR_t = f(G) = A \Pi_i^{a_i} 1.0 - e^{-a_i G_i} \dots \dots \dots (5)$$

where G_1 , G_2 , and G_3 are the labour, capital, and fertiliser, a_i is a parameter. PR is the von Thunen's production function (Blaug, 1985; Lloyd, 1969). According to Lloyd (1969), von Thunen was probably the first economist to have applied the theory of differential calculus in calculating the level of productivity. Lloyd has also believed that von Thunen was perhaps the first person to use calculus to solve the problems of economic optimisation. He further added that von Thunen also has used calculus to interpret the marginal productivity of economic production function. He was the first to formulate that algebraic production functions as Equation 6

$$WPR_t = \text{eff} * CPW^n \dots \dots \dots (6)$$

WPR_t is the output per worker WPR, capital per worker is CPW. Thunen's production function with L (labour) such as:

$$L * WPR_t = \text{eff} * CPW^n * L \dots \dots \dots (7)$$

Based on the above equations, we can conclude that the von Thunen's production function is a hidden Cobb-Douglas's production function (Blaug, 1985; Lloyd, 1969). Based on Equation 7, von Thunen has discovered that labour alone cannot be an effective production input. Von Thunen has then transformed Equation 7 to be Equation 8 (Mishra, 2007).

$$WPR_t = \text{eff} * (L + CPW)^n * L^{n-1} \dots \dots \dots (8)$$

Nevertheless, after a long review process, von Thunen corrected his early notation about labour. In his new discovery, he has found that labour alone can produce product. However, modern economists have never formulated a production function by using labour as the sole factor of production. In addition, in 1923, another scholar named Wicksell introduced a production function that is similar to Cobb-Douglas's production function with an exponential of up to unity. Based on the previous work, Samuelson (1979) presumed a Cobb-Douglas's production function as merely a special case for other production functions. The Cobb-Douglas's production function can be written as follows:

$$PR_t = A L_i^{\beta_1} * CAP_i^{\beta_2} * e^{\mu} \dots \dots \dots (9)$$

where $i=1, 2, 3, \dots, n$

where, PR is output, L is labour, CAP is capital, μ is a stochastic disturbance term. β_1 and β_2 are the elasticities of output with respect to the input of production respectively. Meanwhile, the Marginal Rate Technical of Substitution (MROTS) can be written as follows: -

$$MROTS = \frac{MP_{CAP}}{MP_L} \dots (10)$$

Equation 11 and 12 define the total cost (COST) and the isocost line, respectively, in terms of the quantity of labor (L), the quantity of capital (CAP), the wage rate (w), and the rental price of capital (r).

$$COST = wL + rCAP \dots (11)$$

$$CAP = \frac{COST}{r} - \frac{w}{r}L \dots (12)$$

Equations 13 and 14 are the alternative ways of expressing the necessary condition for the optimal combination of inputs. The first states that the optimum combination is found where the absolute value of the slope of an isoquant (MROTS) is equal to the absolute value of the slope of the isocost line. The second notes that the marginal rate of technical substitution is equal to the ratio of the marginal products of labor and capital and is therefore equal to the absolute value of the slope of the isocost line at the optimum. The last rewrites the second to show that it implies that the optimum combination of inputs is found where the marginal product of an input divided its cost per unit is the same for all inputs.

$$\frac{MP_{CAP}}{MP_L} = \frac{w}{r} \dots (13)$$

$$MROTS = \frac{MP_{CAP}}{MP_L} = \frac{w}{r} \dots (14)$$

The elasticity of substitution of the Cobb Douglas's production function can be expressed as follows:

$$\sigma = \frac{\% \Delta \left(\frac{L}{CAP} \right)}{\% \Delta MRS} = \frac{d \ln \left(\frac{L}{CAP} \right)}{d \ln \left(\frac{w}{r} \right)} \dots (15)$$

If $\sigma = 1$, means that any changes in L/K will be matched by a proportional change in w/r and the relative income that is earned by capital and labour will stay constant. After 33 years, Cobb-Douglas's production function was introduced. Arrow, Chenery, Minhas, and Solow (1961) made some modifications to the function. However, the changes were only an extension of the Cobb Douglas's production function, not an alternative paradigm. One of the Cobb-Douglas's production function properties is that the elasticity of substitution between capital and labour is constrained to unity. However, the production function that was formulated by Arrow et al. (1961) allows the elasticity of substitution labour and capital to be flexible and the value lies between zero and infinity. This function is known as a Constant Elasticity of Substitution (CES). The CES value lies between the Cobb-Douglas's, Leontief's, and linear production functions. Therefore, we said that the CES production function is a special case for those three production functions above. Nevertheless, its value remains fixed along and across isoquant and ignores the size of output or input into the production process. The CES function can be written as follows:

$$PR_t = \gamma [\Phi CAP_i^{-\frac{1}{\sigma}} + (1 - \Phi) * L_i^{-\frac{1}{\sigma}}]^{-\sigma} e^{U_t} \dots (16)$$

where PR_t is value-added, CAP_i is capital, and L_i represents labour. Notations γ , Φ and σ are the efficiency, distribution, and substitution parameters. Meanwhile, the random errors are U_1 , U_2 and U_n . Basically, we assume that the random errors are independent and normally distributed. The number of samples was represented by n. Under the perfect competition, the elasticity of substitution for CES production function is $\sigma = (1 + \rho)^{-1}$. Transformed Equation 9 to log functions as follows:

$$\log \left(\frac{PR_i}{L_i} \right) = \theta_0 + \theta_1 \log w_i + U_i, \dots (17)$$

where $i=1,2,3,\dots,n$

w_i is wage for labour while θ_1 is the CES elasticity of substitution. If the CES elasticity substitution value is 1 ($\sigma = 1$), then we have a Leontief production function. If the elasticity substitution of CES approaches zero, then we get the linear homogeneous Cobb-Douglas's function. Meanwhile, if σ approaches negative infinity, then we get the Leontief's function. Conversely, there are two problems that are related to the CES production function. The first problem is the elasticity of substitution that is constant along and across the isoquant. The second problem is that the researcher used more than two inputs. For example, if there are three inputs of CES production function that may yield three values of elasticity. However, according to the impossibility theorems of Uzawa and McFadden, it is impossible to get the value elasticity if the number of inputs used is more than two (Mishra, 2007). The next production function is the Variable Elasticity of Substitution (VES).

Scholars such as (Hildebrand, Liu, & Liu, 1965) and Lu and Fletcher (1968) generalised the CES production function to allow the Variable Elasticity of Substitution (VES). The VES production function can be written as follows:

$$PR_t = \gamma[\Phi CAP_i^{-\alpha} + (1 - \Phi) * vL_i^{\frac{\alpha}{1+\rho}}]^{-1/\alpha} e^U \dots (18)$$

The random error (U) is independent and normally distributed. Equation 18 is then transformed to log as follow: -

$$\log\left(\frac{PR_t}{L_i}\right) = \theta_0 + \theta_1 \log w_i + \theta_2 \log\left(\frac{CAP_i}{L_i}\right) + U_i \dots (19)$$

where θ_0 , θ_1 and θ_2 are the coefficient of the logarithm of capital-labour ratio. If the value is zero, then the model is reduced to Constant Returns to Scale (CES) production function as Equation 14 The elasticity of substitution for the VES production function can be expressed as follows:

$$\sigma = \theta_1(1 - \epsilon\theta_2)^{-1} \dots (20)$$

where ϵ is the ratio of total factor costs to the rental cost of capital? In mid-1970s, the generalized Cobb-Douglas's production function and the CES were almost complete. Both of these functions assume that the marginal rate technical of substitution (MRTS) of factors of production is contributed by changes in a factor price. In addition, both Cobb-Douglas's and CES production functions are free from the technical progress. These mean that any technological progress may not affect the labor and capital change in the production function. In technical terms, this situation is called Hicks-neutral.

Basically, there are three types of neutrality; Hicks, Harrod, and Solow. Nonetheless, changes in technology may cause changes in production possibilities. Hicks-neutral situation is related to changing in technology. However, the changes in technology may not affect the capital-labor ratio if a factor price is unchanged. Meanwhile, a technological change is assumed to be Harrod-neutral if the changes in technology do not affect a capital-labor ratio when capital price is unchanged. In the meantime, the technological change is Solow-neutral if the labor is unchanged. The unchanged labor may cause a capital-labor ratio to be unchanged.

3. Method

There are several methods that are available to test the long-run relationship between regressor such as residual model by Granger (1987), and Johansen and Juselius (1990). However, the present study employed the autoregressive distributed lag (ARDL) approach developed by Pesaran, Shin, and Smith (2001). This technique has been popular for recent years and is often used to analyse the long-run relationship between the regressor in the empirical model. This technique also allows the dynamic interactions among the variables. There are a few reasons why this technique is chosen. First, ARDL model gives power and testing of the long-run relationship for the different order of integration, while the other method required all the explanatory integrated in the same order. Therefore, ARDL method is not required for pre-testing of the order of integration of the variables in the model. Hence, ARDL approach to cointegration can be applied regardless of whether the underlying explanatory variables are purely I(0), purely I(1) or mutually co-integrated (Verma, 2007). However, for the accurate result, the response variable needs to be integrated at order one I(1). According to Pesaran et al. (2001), when pre-testing is involved, a certain degree of uncertainty (I(0), I(1) or mutually cointegrated with regard to the analysis of level relationships is created. Therefore, this situation may create problems to the researcher in selecting the appropriate method of analysis. Furthermore, numerous scholars claim that unit root tests lack power and have poor size property especially in small sample size series (Virmani, 2004).

$$\begin{aligned} \ln PR_t = & \frac{a_0}{\mu(1)} + a_1 \ln PadA_t + a_2 \ln labB30_t + a_3 \ln labA60_t + a_4 \ln Cap_t + a_5 \ln AvgPP_t + a_6 \ln AvgFU_t + \\ & \frac{1}{\mu(1)} \sum_{i=1}^{m_1-1} a_1 \Delta \ln PadA_{t-i} + \frac{1}{\mu(1)} \sum_{i=1}^{m_2-1} a_2 \Delta \ln labB30_{t-i} + \frac{1}{\mu(1)} \sum_{i=1}^{m_3-1} a_3 \Delta \ln labA60_{t-i} + \frac{1}{\mu(1)} \sum_{i=1}^{m_4-1} a_4 \Delta \ln Cap_{t-i} + \\ & \frac{1}{\mu(1)} \sum_{i=1}^{m_5-1} a_5 \Delta \ln AvgPP_{t-i} + \frac{1}{\mu(1)} \sum_{i=1}^{m_6-1} a_6 \Delta \ln AvgFU_{t-i} \\ & + \epsilon_t \dots (21) \end{aligned}$$

Where,

$\ln PR_t$: natural logarithm of average paddy yield for main and off season in metric ton per hectare

$\ln PadA$: Area cultivation (hectare) per season.

$\ln labB30$:labour age below 30 to 60 years old ('000) per season

lnlabA60: labour age below 61 to 71 years old ('000) per season

ln Cap: cost of capital used (Bahts) per hectare.

lnAvgPP: Natural logarithm average local paddy price

lnAvgFU: Average fertilizer used.

4. Results

Results and Discussions

The results of the correlation test between dependent variable and independent variables proved to be very useful in pre estimation analysis especially as regards potential relationships suggested by theories. Therefore prior to the econometrics analysis, the statistical correlation of the variables are examined which helped in determining the statistical relationships between and amongst the variables (see Table 1).

Table 1. Correlation Analysis

	PR	PadA	labB30	labA60	Cap	AvgPP	AvgFU
PR	1.00						
	--						
PadA	0.15 (0.41)	1.00					
	--	--					
labB30	0.20 (0.27)	0.13 (0.48)	1.00				
	--	--	--				
labA60	0.26 (0.15)	-0.13 (0.46)	0.41 (0.02)	1.00			
	--	--	--	--			
Cap	0.03 (0.87)	-0.12 (0.52)	0.43 (0.01)	0.03 (0.88)	1.00		
	--	--	--	--	--		
AvgPP	0.53 (0.71)	0.42 (0.59)	0.51 (0.21)	0.29 (0.48)	0.72 (0.38)	1.00	
	--	--	--	--	--	--	
AvgFU	0.43 (0.51)	0.89 (0.57)	0.092 (0.32)	0.32 (0.20)	0.43 (0.34)	0.82 (0.32)	1.00
	--	--	--	--	--	--	--

ASEAN's optimum models selection was undertaken as depicted by Table 2 and the Table 3. The selected models are , ARDL (1,1,0,2,1,0,1,2,0,0,0,0)

Table 2. ARDL IV Long-run Estimates

Variables	Coefficient ts	Standard Error	t- statistics	p-Value
ARDL (1,1,0,2,1,0,1,2,0,0,0,0)				
lnPadA	0.415	0.142	1.522	0.238
lnPadA (-1)	0.455	0.147	3.090	0.006***
lnlabB30	0.010	0.019	1.427	0.224
lnlabB30 (-1)	0.000	0.201	5.938	0.000***
lnlabA60	-0.477	-0.137	-3.498	0.232*
lnCap	0.001	0.001	4.202	0.003***
lnAvgPP	0.023	0.043	0.526	0.604
lnAvgPP (-1)	0.065	0.037	3.763	0.000***
lnAvgFU	0.142	0.121	4.003	0.002**
ΔlnPadA	0.033	0.048	0.689	0.499
ΔlnPadA (-1)	0.097	0.053	1.831	0.083**
ΔlnlabB30	0.429	0.118	3.624	0.001*
ΔlnlabA60	0.000	0.000	4.158	0.000*
ΔlnCap (-1)	0.000	0.000	1.902	0.123
ΔlnCap (-2)	0.000	0.000	3.352	0.003**
Δln AvgPP	-1.214	0.380	3.194	0.004**
Δln AvgFU	-0.291	0.076	3.854	0.001**
C	7.406	2.882	2.570	0.018*
T	0.045	0.009	4.731	0.000*

In present study, it has been observed that old and young farmers, capital, land, paddy price, and fertilizers are the significant paddy production inputs and are capable of influencing the production volume both in the short and the long run. Other than being the determinants of paddy production, these factors also play significant role in the productivity growth of paddy sub-sectors. The integration of these production factors has shown that Thailand occupies a productivity growth rate of less than 5%, which is un-favorable for the overall paddy sub-sectors' growth. However, in the long run, the lower levels of productivity growth will lead to greater dependency upon the rice import. The constantly obtaining lower paddy production levels may create several issues, such as insufficient food supply for satisfying people demand. Thus, the productivity of paddy must be improved to enhance revenues, using better technology, research and development, high quality seeds, and high capital investments. Furthermore, certain cultivation techniques must be introduced which could help in the rice breed germination such as, System of Rice Intensification (SRI) and transplanting.

Meanwhile, there is inelastic substitution between labor and capital with a value close to 1. This indicates that substitution between labor and capital is not complicated, which implies the willingness of Thai farmers to integrate new technology in their activities. Integration of technology and machinery into farming activities has gradually replaced the labors part in farming, which is further expected to help this sector to switch towards labor-saving technologies. Thus, this research observed that old and young farmers may act as perfect substitutes, thereby implying that no significant impact can be witnessed on the paddy yield with different farming experience, particularly because most farmers in Thailand use similar types of machinery and technology in farming processes. Furthermore, since labor can now be replaced with machines, therefore it is the reason why old and young farmers do not consider as a major area of concern in terms of paddy cultivation.

5. Conclusion

The current research has found that land, capital, young farmers, old farmers, fertiliser, and paddy price are the important inputs in paddy production. All these inputs can influence the volume of production either in the short-run or long-run. Apart from being the determining factors in paddy production, all these factors are also important in the paddy sub-sector productivity growth. By using all of these production factors, the study has found that the level of the productivity growth for all four Thailand regions is lower than 5 per cent. This situation is not favorable to the growth of the paddy sub-sector as a whole. In the long-term, if the productivity growth is low, then this will create a dependency on rice import. Even if the level of paddy production is still low, this situation will create problems of inadequate food supply to meet the demand of the people.

Meanwhile, the substitution between capital and labour is inelastic and the value is near to one. These show that the substitution between capital and labor is not so difficult, which indirectly shows that the farmers in the Thailand areas are willing to accept the inclusion of technology in the farming activities. Gradually, the use of machinery and technology has replaced the role of labours in farming activities. This may help this sector towards the labour-saving technologies. Being concurrent with the above findings, the present study has found that young farmers and old farmers are a perfect substitute. These indicate that the difference in farming experience does not give a significant impact to the paddy yield. This is because young and old farmers in Thailand regions basically use a homogeneous level of technology or machinery. The question of whether young or old farmers are not a major concern in the paddy cultivation in the Thailand areas is because machines can replace labors in a lot of ways.

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Sudawan SOMJAI is an Assistant Professor and Director of the Doctor of Philosophy Program in Development Administration, Suan Sunandha Rajabhat University, Thailand. Her research areas are Public and Private Administration, Development Administration, Leadership and Social Sciences Research and have many articles in these areas.

ORCID: <https://orcid.org/0000-0002-8294-8166>

Thitinan CHANKOSON is an Assistant Professor of Business Administration at the Faculty of Business Administration for Society, Srinakharinwirot University, Thailand. He holds a Doctor of Science in International Service Business Management from North Eastern University, Thailand. His research interests are service business management, aviation management, international business management, supply chain management, and tourism and hospitality industry.

ORCID: <https://orcid.org/0000-0003-1855-678X>

Kittisak JERMSITTIPARSER holds Ph.D. in Social Sciences from Kasetsart University, Thailand. He is currently a researcher at Chulalongkorn University Social Research Institute, a part-time researcher at Ton Duc Thang University, and the secretary general of Political Science Association of Kasetsart University. His areas of expertise are Political Science, Public and Business Administration, and Interdisciplinary Research in Social Sciences.

ORCID: <https://orcid.org/0000-0003-3245-8705>

Register for an ORCID ID:

<https://orcid.org/register>

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***THE RELATION BETWEEN AGING OF POPULATION AND SUSTAINABLE DEVELOPMENT OF EU COUNTRIES**

Ieva Meidutė-Kavaliauskienė¹, Gitana Dudzevičiūtė², Nijolė Maknickienė³, Aidas Vasilis Vasiliauskas⁴

^{1, 2, 4} General Jonas Zemaitis Military Academy of Lithuania, Silo str. 5A, Vilnius, Lithuania

³ Business management faculty, Vilnius Gediminas Technical University, Sauletekio al. 11, Vilnius, Lithuania

E-mails: ieva.meidute@lka.lt ; gitana.dudzeviciute@lka.lt ; nijole.maknickiene@vgtu.lt ; aidas.vasilisvasiliauskas@lka.lt

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Abstract. Sustainable development is based on the idea of achieving an acceptable level of social, economic, and cultural development. However, there are a lot of impediments to achieving this idea so far. Population aging is one of these (and, probably, major) global trends affecting all countries and putting the realization of sustainable development goals at risk. The main goal of this article, therefore, is to test the relation between aging and three groups of indicators of sustainable development of EU countries. The investigation that forms the basis of the given article has focused on the median age of the population and six sustainable development indicators of the EU countries. The analysis covers annual data of the period from 2000 to 2018. All variables have been obtained from the Eurostat database. This has provided a possibility to compare the EU countries by indicators under consideration.

Keywords: sustainable development; sustainable development indicators; population ageing; EU regions

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JEL Classifications: J00, J11, J19

1. Introduction

In the studies of international organizations (United Nations et al., 2003), three approaches to sustainable development have prevailed, as follows: 1) the first approach considers sustainable development as economic, social and environmental systems, all of which must be simultaneously sustainable; 2) the second approach is ecosystem health, which views the economic and social systems as subsystems of the global environment. This approach is focused on the pressures placed on ecosystems by human activities; 3) the third approach is related to resources or capital and views sustainable development as development ensuring non-declining per capita national wealth by conserving or replacing the stocks of produced human, social and natural capital.

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While economists have been contributing to the discussion of various aspects of sustainability, it is notable that the term “sustainability economics” does not refer to any explicit definition, and is not obviously joined by the characteristics, such as subject focus, methodology, or institutional background (Baumgärtner, Quaas, 2010). Sustainability is not only a matter of acting in another way. It is creating another logic of economics. The science of economic needs to be grounded in understanding of economics and business activities and how this could be connected to sustainability (Clark, 2018). Sustainable economics requires a systemic approach first taking societal changes into consideration.

Tendencies in population aging are particularly relevant to the Sustainable Development Goals related to inequalities between and within countries, poverty, ensuring healthy lives and wellbeing at all ages, promoting gender equality and productive employment and making human settlements safe, inclusive, resilient and sustainable (United Nations, 2017). Population aging is a major global trend that affects all countries, at a different level (Dugarova, Gülasan, 2017; World Bank Group, 2016, United Nations, 2017).

The main question and, therefore, the goal of this article that the authors are rising is, if there are relations between aging and three groups of indicators of sustainable development of EU countries (and if yes, then, to what extent).

In order to answer this question, the article starts with an in-depth analysis of scientific literature associated with the topics of sustainability, population aging and indicators used to track and evaluate sustainable development from different perspectives. This is followed by Chapter 2, which discusses the methodology applied to conduct research and reasons why several key indicators of aging were chosen for further investigation. Chapter 3, then, provides basic findings of the research related to aging and relations between aging and three groups of indicators of sustainable development of EU countries. The article ends with some investigation findings and discussion questions for further research in this important field.

2. Literature review

Concept of sustainability. The first and one of the most important conferences of the United Nations on the Human Environment was held in Stockholm, Sweden, in 1972, which presented initial conceptions regarding sustainable development. In 1987, The Brundtland Report was published propagating that sustainable development meets the needs of the present without compromising the ability of future generations to meet their needs (Brundtland Report, 1987; Nogueira, 2019).

In the last decade, the phenomenon of economy and the factors affecting its development got attention from a vast number of scientists all around the world (Cowell, 2013; Dudzevičiūtė, 2015; Chapple, Montero, 2016; Jiang et al., 2017; Atienza et al., 2018; Athukorala, Narayanan, 2018; Lihtmaa et al., 2018, Maknickienė et al., 2018, Dobrovolskiene, et al., 2019, Reis et al., 2019; Moumen et al., 2019; Estevaro et al., 2019; Mauerhofer, 2019, Baltgailis, 2019; Prakash, Garg, 2019; Vigliarolo, 2020; Pereira et al., 2020).

It should be noted that many of these scientists argue over the concept of a traditional and sustainable economy. (Bartelmus, 2010; Daniels, 2010; Todaro, Smith, 2011; Blum, Legey, 2012; Lund, Hvelplund, 2012; Binder, Witt, 2012; Birkin, Polesie, 2013; Lejano, Stokols, 2013; Stankevičienė et al., 2014; Vokoun, 2016; Nogueira, 2019; Bartley, 2019, Reis et al., 2019). In the work of Todaro and Smith (2011) three different attitudes towards the development of the economy are distinguished, i.e., traditional attitude, new economy attitude and Amartya Sen’s attitude of “abilities”.

The traditional attitude of economic development is based on the indicator of gross domestic product per capita, which clearly indicates the wellbeing of the society and the exact level of economic development. However, this indicator does not always represent a real situation, and, hence, sometimes is too narrow. This new attitude describes economic development as a multidimensional process encompassing a great number of activities of different institutions, aiming at economic growth, different decisions to increase social cohesion, distribution of resources in order to assure a better quality of life for the entire society (Todaro, Smith, 2011; Dudzevičiūtė, 2015).

In accordance to the Amartya Sen's attitude of "abilities", economic development should be directed towards the reinforcement of the sense of self-esteem and freedom. According to this attitude, economic development should eliminate all factors that prevent freedom and economic possibilities (Todaro, Smith, 2011). Binder and Witt (2012) argued if sustainable development can benefit from the synthesis with the Amartya Sen's attitude of "abilities" while obtaining firm normative background and wider application at the same time.

According to Remig (2015), the debate about sustainability economics has stimulated many of the contributions in the scientific literature. There is no application of the concept of sustainability economics in a specific context as there are many unclear aspects of what sustainability economics strives to and which underlying criteria will be chosen.

All in all, the concept of sustainable development is based on the evaluation of how decisions of the society in one of the fields – economy, social, and environmental – will impact the other two. In scientific articles, sustainable development (Bartelmus, 2010; Blum, Legey, 2012; Lund, Hvelplund, 2012; Stankevičienė et al., 2014; Vokoun, 2016; Maknickienė et al., 2018; Nogueira, 2019, Sarma et al., 2019; Reis et.al., 2019; Pereira et al., 2020) is analyzed in relation to different approaches: ecological sustainability of the resilience of ecosystems; economic sustainability of non-declining welfare, the notion of theoretical environmental economics; economic sustainability of economic performance and growth, using modified accounting indicators of produced and natural capital formation; and sustainability of development, which seeks to meet present and future needs of the society.

Goals and indicators of sustainable development. It is notable that the evolution of sustainable development concepts requires a shift toward a systemic and integrated perspective that facilitates the understanding of complexity (Liboni and Cezarino, 2014; Eustachio et al., 2019). In the scientific context, different views exist to assess the progress of sustainable development (Bell and Morse 2001). For example, the EU provides a list of sustainable development goals that are provided in Table 1.

Table 1. Sustainable development goals of the European Union

Goals	
No poverty	Zero hunger
Good health and well-being	Quality education
Gender equality	Clean water and sanitation
Affordable and clean energy	Decent work and economic growth
Industry innovation and infrastructure	Reduced inequalities
Sustainable cities and communities	Responsible consumption and production
Climate action	Life below water
Life on land	Peace, justice, and strong institutions
Partnerships for the goals	

Source: Compiled by authors based on information from the Statistical Offices of the European Union (2018)

Eustachio et al. (2019) revealed 14 indicators for evaluating the sustainability. The relationship between sustainable development indicators and goals is presented in Table 2.

Table 2. Relationship between sustainable development indicators and goals

Sustainable development indicators	Sustainable development goals
Infrastructure, health, and no hunger	Clean water and sanitation Good health and well-being Zero hunger Affordable and clean energy Partnerships for the goals Responsible consumption and production Sustainable cities and communities Gender equality
Life on land and below water	Life on land Life below water Reduced inequalities Industry innovation and infrastructure
Education	Quality education
Economic growth	Decent work and economic growth
Firm's corruption	Peace, justice, and strong institutions
No poverty	No poverty
Preservation of natural resources	Responsible consumption and production
Clean energy and gender equality	Affordable and clean energy Gender equality
International trade	Partnerships for the goals
Industry activity	Industry innovation and infrastructure
Peace and justice	Peace, justice, and strong institutions
Employment, gender, and country equality	Gender equality Reduced inequalities Decent work and economic growth
Growth rate in consumption and income	Reduced inequalities
No air pollution	Sustainable cities and communities

Source: Eustachio *et al.* (2019)

Efficient indicators, monitoring systems, and strong governance are needed for the countries seeking to become sustainable (Allen et al., 2017; Eustachio et al., 2019; Bartniczak, Raszkowski, 2019). However, despite the fact that the sustainable development indicators offered by international institutions, organizations, and scientists differ slightly, the focus while evaluating sustainable development should be on assessing economic, social, and environmental processes.

Relation between sustainable development and population aging. According to the World Health Organization (2015) and the United Nations (2017), the global strategy on aging will have an impact on the realization of the Sustainable Development Goals. The tendencies in population aging are particularly relevant to the Sustainable Development Goals related to inequalities between and within countries, poverty, ensuring healthy lives and wellbeing at all ages, promoting gender equality and productive employment and making human settlements safe, inclusive, resilient, and sustainable (United Nations, 2017). By 2050, the population over the age of 60 will double (World Health Organization, 2015). This demographic change is having a strong impact on sustainable development because as people grow older, their needs, health and what they value change accordingly. In 2015, older women tended to be more marginalized and disadvantaged than older men, showing higher rates of poverty among older women (United Nations, 2017). Chapman and Shigetomi (2018) investigated sustainable

development by incorporating an approach to stakeholder engagement. The study assessed sustainability, identifying a gap in terms of the inclusion of the householder perceived importance of lifestyle-related factors in sustainable development policymaking. The investigation of householders was undertaken using a case study of the aging population of Japan, which demonstrated that lifestyle relevant factors of sustainability approximate jurisdictionally important Sustainable Development Goals of the United Nations. The authors assessed the importance of 6 general lifestyle factors, such as environmental protection, preserving limited resources, climate change, a healthy economy, a convenient lifestyle and equitable society. The case study of Japanese has revealed that the four factors like environmental protection, a healthy economy, preserving limited resources and equitable society, were the most important to respondents. Climate change was considered slightly less important and a convenient lifestyle was given the lowest priority of all. Moreover, the variety across household generations was identified. The investigation revealed that in general, older households place a higher priority on the environment, climate change issues, resource management, the economy, and social equity, while younger people place a higher priority on convenience. The research of Kiely et al. (2019) presented a broad narrative review of the epidemiological evidence on how the mental health of older adults varies by gender. The investigation revealed that compared to older men, older women are more likely to experience common mental disorders such as depression and anxiety. In contrast, mortality-related impacts of poor mental health are more severe in older men. The study of Leeson (2019) confirmed the relationship between increasing age and death. Besides, the research indicated large increases in home-based deaths, particularly for men aged 65 and over.

3. Methodology

The investigation that forms the basis of the given article has focused on the median age of the population and six sustainable development indicators of the EU countries. The analysis covers annual data for the period from 2000 to 2018. All variables have been obtained from the Eurostat database. It has provided a possibility to compare the EU countries by the indicators under consideration. Referring to the Eurostat (2019) information, we provide the descriptions of the indicators used in the research below.

The median age of a population is the age that divides this population into two numerically equal groups. It means that one half of people from this population are younger than the median age and the other half of them are older. The indicator of people at risk of poverty or social exclusion relates to the sum of persons who are at risk of poverty after social transfers, who are severely materially deprived or living in households with very low work intensity. Persons are considered to be at risk of poverty if they have a disposable income below the risk-of-poverty threshold, which is set at 60 % of the national median disposable income.

At risk of poverty rate measures the share of persons who are employed and have a disposable income below the risk-of-poverty threshold. A person is considered as being employed if he was employed for more than half of the reference year.

Municipal Waste by Waste Management Operations includes wastes produced by households and other sources such as offices, commerce, and public institutions and collected by or on behalf of municipal authorities and disposed of through the waste management system.

The Share of Energy from Renewable Sources is constructed on energy statistics data, which cover all major sectors of the economy, such as energy sector, industrial sector, commercial and public services, transport, agricultural, forestry, and fishing.

Intramural R&D Expenditure involves all spending for R&D performed within a statistical unit or sector of the economy during a specified period.

Employment in Technology and Knowledge-intensive Sectors at the national level consists of economic, employment and science, technology and innovation data describing industries of manufacturing and services or products broken down by technological intensity. When we cannot find a linear causal relationship between variables, the classification method can provide enough information to link certain datasets to each other. The problem of classification answers the question: if there were predictor values for new observations obtained, can these determine to which classes those observations will belong?

With the aim at getting information required for the analysis, the k-mean method, MatLab algorithm, was selected for clustering the data on aging and sustainable development. This method is used in order to find out the correlations and associations between data fields (Bansal et al. 2017). k-means clustering aims to group n observations into k clusters thus each observation belongs to the cluster with the nearest mean. The k-means algorithm consists of two steps:

- each observation is assigned to a cluster the mean of which has the least squared Euclidean distance;
- new means of the observations in the new clusters are calculated.

In order to investigate the relationships between aging and different indicators of sustainability, the decision tree method, MatLab algorithm, was selected. This powerful statistical tool is using variable detection, assesses the relative importance of variables, detects the missing values, makes predictions, interpretations, and data manipulations (Song, Ying, 2015). Classification trees consist of next structures: leaves represent class labels and branches represent conjunctions of features that form those class labels. Each branch represents the outcome of a test and each leaf (or terminal) node holds a class label. The decision tree is the predictive model that connects observations about a dataset (represented in the branches) and conclusions about the target dataset (represented in the leaves).

4. Results of Investigation

Aging. Aging of EU countries was measured by measuring the median of each country population during the period from 2000 to 2018. In 2000, the median of less than 35 years was in Ireland, Cyprus, Slovakia, and Romania and did not reach 40 years in all countries. In 2018, the median age of these populations was between 37.3 and 46.3 years. (Fig. 1)

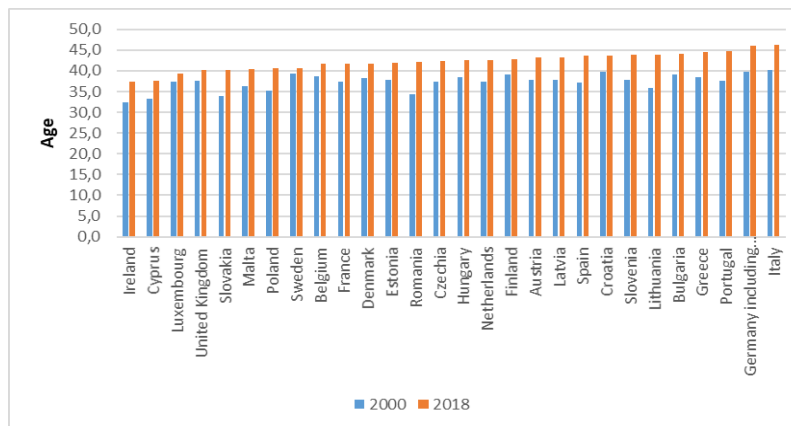


Fig. 1. Age median of EU countries population between 2000 and 2018 (created by authors according Eurostat (2019))

Investigation of the aging growth rate in each country revealed very big differences between countries (Fig.2). Small changes (3-7 %) in aging were found in Sweden, Luxembourg, United Kingdom, and Belgium. These countries are well developed with old family traditions. The biggest changes in the aging growth rate were found in Lithuania (23%) and Romania (22%) – post-Soviet countries that have a very high level of emigration. Alongside is Portugal, Slovakia, and Spain, but in this case, to name the reason is not that simple.

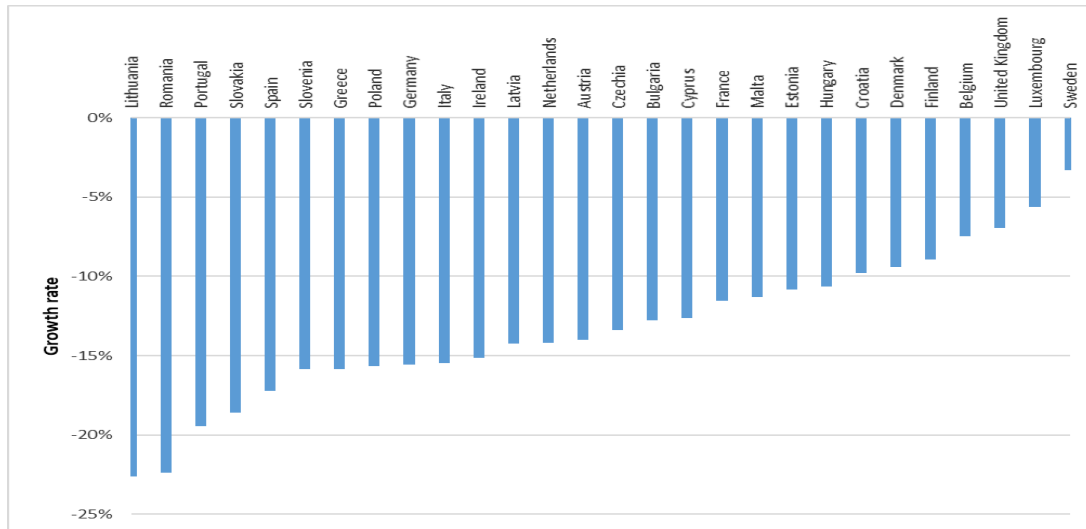


Fig. 2. Age median growth rate of EU countries population between 2000 and 2018 (created by authors according Eurostat (2019))

How does aging relate to sustainable development and does it affect the achievement of the EU's sustainable development objectives? Perhaps certain changes to the phenomena of sustainable development are related to the growth rate of aging.

Aging and indicators of sustainable development. The relation between aging and three groups of indicators of sustainable development of EU countries: social capacity, environmental capacity, and economic capacity, was investigated by the k-mean classification algorithm. The percentage growth rate of people at risk of poverty or social exclusion was selected as a measure reflecting changes to a social capacity in the country. This classification shows that declining poverty rates are typical for countries with high to moderate aging rates and increasing poverty rates (positive) are more likely in countries with medium to low aging rates (Fig. 3).

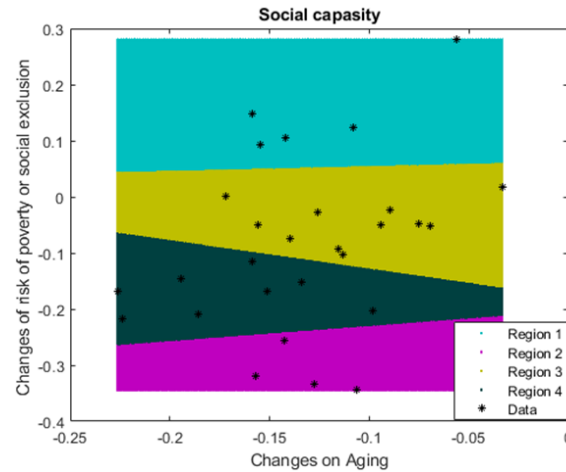


Fig. 3. The percentage change in people at risk of poverty or social exclusion in all EU countries in relation to aging changes (created by authors)

Classification of the growth rate of variable In-work at risk of poverty according to growth rate of aging detected four layers (Fig. 4). The high rate of poverty among working people is linked to the high rate of aging. A small increase in poverty is found across the entire scale of aging. The low rate of poverty reduction is associated with a moderate rate of aging. Meanwhile, the high rate of poverty reduction among the working population is associated with a moderate to low aging rate.

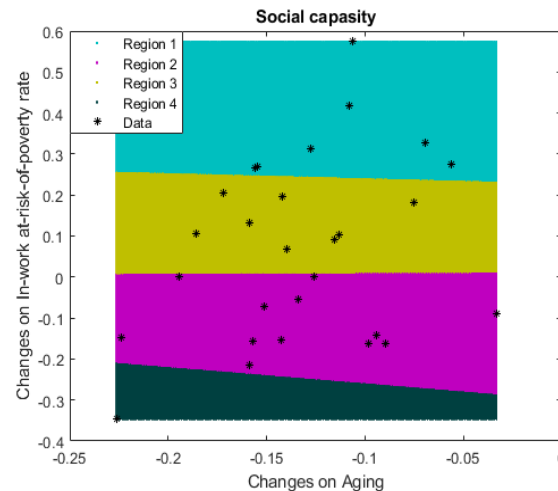


Fig. 4. In-work at-risk-of-poverty rate changes in all EU countries in relation to aging changes (created by authors)

The investigation of the environmental capacity of sustainable development includes the Municipal Waste by Waste Management Operations and the Share of Energy from Renewable Sources. Municipal waste is mainly produced by households and small commerce and public organizations. Classification excludes four countries with very low aging rates and near-zero growth rate of municipal waste due to waste management operations (Fig. 5). The remaining countries are divided into three layers. The large increase in municipal waste is associated with a moderate to high rate of aging. Very many countries have close to zero municipal waste changes and average aging rates. Countries with a clearly increasing municipal waste have moderate to high aging rates.

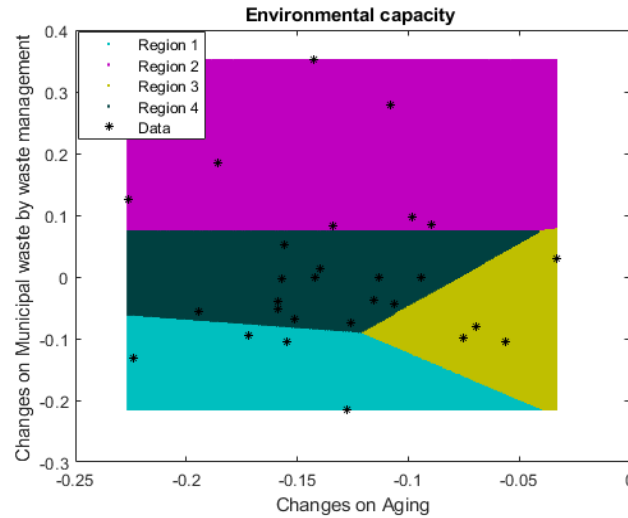


Fig. 5. Changes in Municipal Waste by Waste Management Operations in all EU countries in relation to aging changes (created by authors)

Changes in Share of Energy from Renewable Sources are positive for all countries (Fig. 6). Malta stands out very strongly with a growth rate of 6. United Kingdom and Luxembourg also have strong renewable energy growth of 1.77 and 1.23 respectively. The rate of change in five other countries ranged from 0.60 to 0.84, while the remaining others ranged from 0.06 to 0.40. In most countries, indicators are scattered across the entire scale of aging.

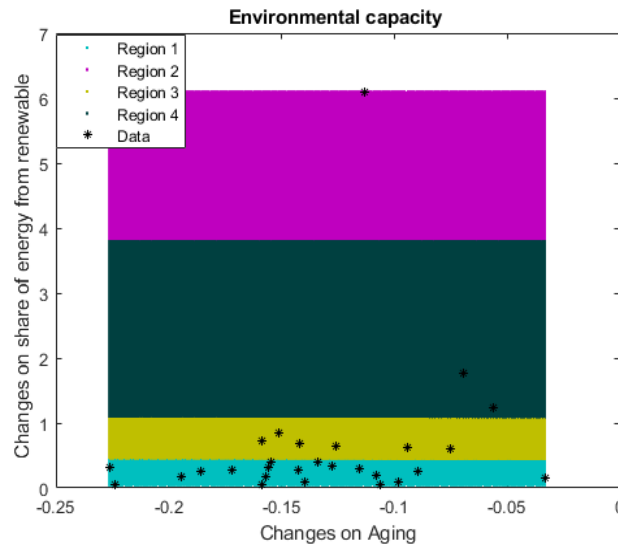


Fig. 6. Changes in Share of Energy from Renewable Sources in all EU countries in relation to aging changes (created by authors)

Finland (-0.14), Spain (-0.04), Portugal (-0.04), and Luxembourg (-0.02) have decreasing R&D expenditure, while other countries – increasing. Countries with little positive or negative change in this indicator are scattered across the entire aging scale (Fig. 7). Countries with an increase in R&D expenditure of around 0.2 to 0.4 have moderate or low aging growth, while countries in the range of 0.4 to 0.65 – only moderate. Bulgaria (0.89), Lithuania (0.88), Poland (0.86), Slovakia (0.78), and Romania (0.71) have fast R&D spending growth and rapid aging.

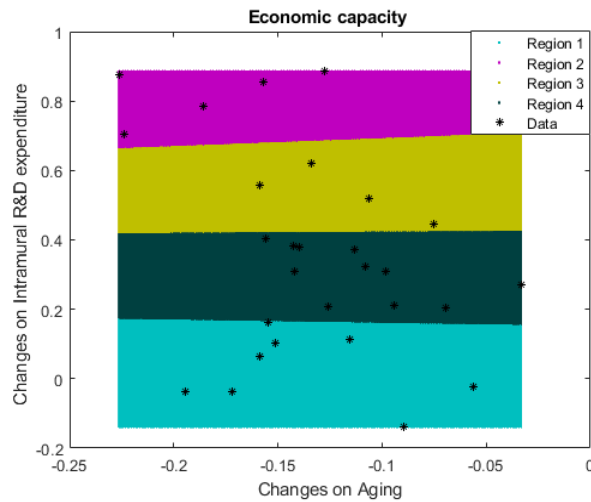


Fig. 7. Changes in Intramural R&D Expenditure in all EU countries in relation to aging changes (created by authors)

Denmark (-0.04), Germany (-0.02), and Finland (-0.02) have decreasing Employment in Technology and Knowledge-intensive Sectors at the national level, other countries – increasing. Small negative and positive interval (-0.04; 0.1) of this indicator is divided into two regions according to aging changes – less than -0.14 and more than -0.14. When the indicator is in the range (0.1; 0.4), the aging indicators are scattered across the entire scale of the aging indicator. And when the score is greater than 0.4, the aging rate is moderate to high.

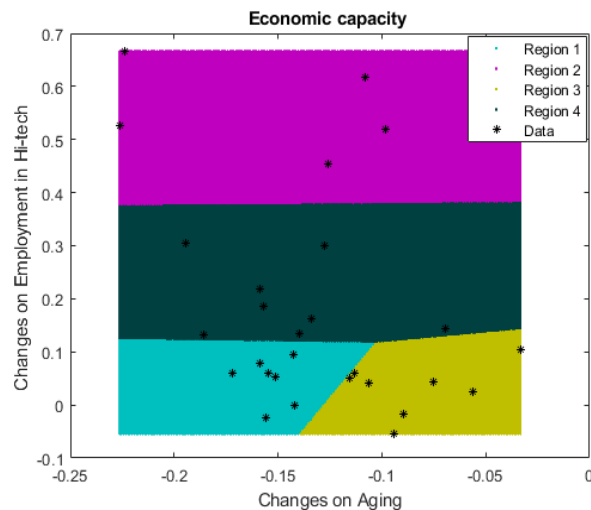


Fig. 8. Changes in Employment in Technology and Knowledge-intensive Sectors at the national level in all EU countries in relation to aging changes (created by authors)

The study shows that there is no strong causal link between the rate of aging and sustainable development. Most regions in the classification are layered, and data shifts of greater or lesser extent are present in those layers. However, two indicators have well-defined regions, dividing the aging scale into low and high values. Classification by Changes in Municipal Waste by Waste Management Operations indicator excludes countries with very low aging rates and near-zero growth rate of Municipal Waste by Waste Management Operations.

Classification by Employment in Technology and Knowledge-intensive Sectors at the national level indicator is divided into two regions of moderate and small aging changes.

Classification of sustainable indicator groups with valuation growth of aging. In order to find relations between three groups of indicators of sustainable development of EU countries: social capacity, environmental capacity, and economic capacity, there was a classification tree method used. The aging rate in the EU countries ranges from 3 to 23 percent over the period of 2000-2018. The study found that the aging rate is significant if it is 3 times or more lowest than the lowest aging rate (Sweden 3%). The category assigned to a significant rate of aging is denoted as 1 and the non-significant – as 0.

Social capacity is represented by these indicators: changes in the percent of people at risk of poverty or social exclusion (work) and changes in the In-work at-risk-of-poverty rate (poverty). For presentation purposes, the classification tree algorithm has selected 4 classes (Fig. 9). When the “work” indicator is bigger than 0.32, the rate of aging is not significant. The ability to make a living from work leads to a lower rate of aging. When the “work” indicator is smaller than 0.32 and the “poverty” indicator is smaller than -0.109 – the aging changing rate is significant. The inability to survive from work leads to a higher rate of aging. When “poverty” is bigger than -0.109 and “work” is between 0.1889 and 0.32, then aging changes are significant. This suggests that there may be more causes of aging than only poverty.

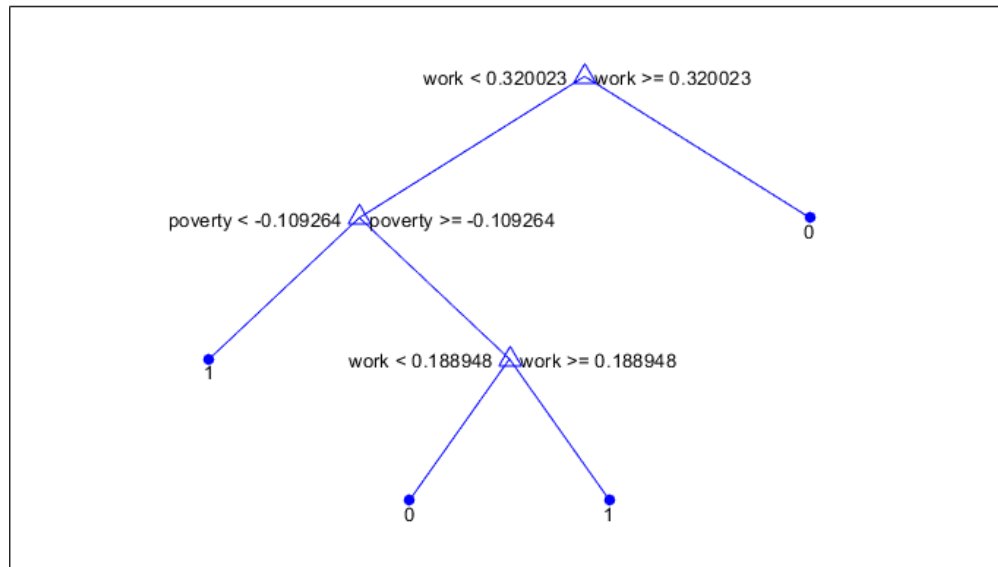


Fig. 9. Intervals of social capacity indicators in relation to aging changes (created by authors)

Environmental capacity is represented by indicators: changes in the Municipal Waste by Waste Management (waste) and changes in the Share of Energy from Renewable Sources (energy) (Fig. 10). The Classification tree algorithm selected two classes with useful accuracy. Low Aging growth can be found only when changes in the Share of Energy from Renewable Sources is bigger than 1.03. Only three countries have this range: Malta, the United Kingdom, and Luxembourg.

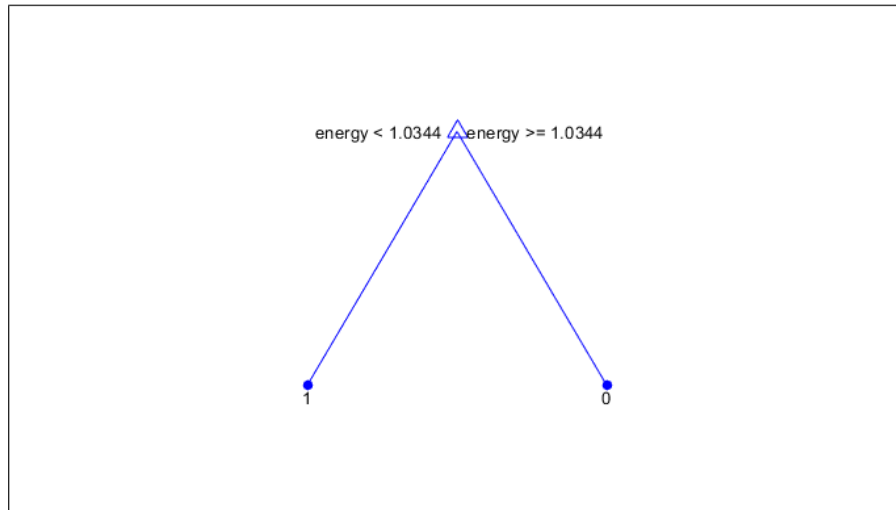


Fig. 10. Intervals in environmental capacity indicators in relation to aging changes (created by authors)

Economic capacity is represented by the indicators that highly impact the economic growth: changes in the Intramural R&D Expenditure (R&D) and changes in the Employment in Technology and Knowledge-intensive Sectors at the national level (hi-tech) (11 Fig). For presentation purposes, the Classification algorithm has selected 4 classes. When R&D is bigger than 0.538, changes in aging are significant. Countries that are sharply increasing their R&D spending, have problems with rapid aging. When R&D is smaller than 0.538 and hi-tech is less than 0.0516, the aging rate is not significant. Countries with low levels of R&D and high-tech human resources have low aging rates. When hi-tech is more than 0.05 and R&D is less than 0.182, aging rate is significant. Countries where the number of people working in the high-tech field is rapidly growing and the expenditure on R&D is growing very slowly – has a high rate of aging.

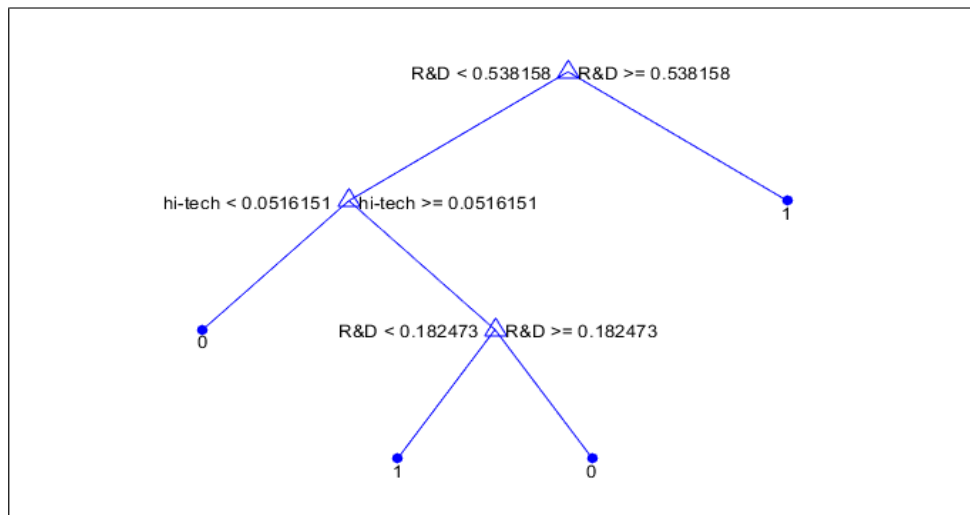


Fig. 11. Intervals of economical capacity indicators in relation to aging changes (created by authors)

The categorization of aging revealed the influence of groups of sustainability indicators in the rate of aging. Social capacity and economical capacity indicators have a relation to aging growth. Investigation of environmental capacity revealed the impact from only one indicator – changes in Share of Energy from Renewable Sources.

Accuracy of classification (errors). Linear discriminant analysis (lda) and quadratic discriminant analysis (qda) were used to evaluate the accuracy of classification. Cross-validation (CV) divides the training set into 10 random disjoint subsets. Remove one subset, train the classification model using the other nine subsets, and use the trained model to classify the removed subset. K-fold cross-validation partition consists of:

- number of observations - 28,
- number of test sets - 10;
- train size: 26 25 25 25 25 25 25 25 25 26;
- test size: 2 3 3 3 3 3 3 3 3 2.

Table 3. Errors of classification

Error	Social capacity	Environmental capacity	Economic capacity
ldaCVerErr	0.4286	0.3929	0.4286
qdaCVerErr	0.5357	0.3571	0.6071
dtResubErr	0.1786	0.1786	0.1786
dtCVerErr	0.4643	0.6429	0.5714
ans	0.3929	0.3214	0.3929

Source: Created by authors

Errors of classification are presented in Table 3. The true test error for lda using 10-fold stratified cross-validation is signed by IdaCVerErr, and for qda is signed QdaCVerErr. Resubstitution error and the cross-validation error for decision tree (dt) is signed as dtResurbErr and dtCVerErr, respectively. The final estimated misclassification error is signed as ans.

Conclusions

Demographical statistical data of EU countries show that the median age of the population of each country in 2000 was between 32.4 and 40.1 while in 2018 – between 37.3 and 46.3. Aging growth rate for the same year interval varies from 3 % to 23 %. As a result, the countries of the European Union are aging, and some of them are aging very fast.

K-mean classification algorithm was used for investigation of relations between the aging growth rate and the growth rate of six indicators that meet the Sustainable Development Goals of EU. Percent of people at risk of poverty or social exclusion and In-work at-risk-of-poverty rate represents the social capacity, Municipal Waste by Waste Management Operations and Share of Energy from Renewable Sources represent the environmental capacity, Intramural R&D Expenditure and Employment in Technology and Knowledge-intensive Sectors at the national level represent the economic capacity. Most regions in the classification are layered; this means that indicators are distributed across the aging scale and in many cases, no causal relationship was found. However, two indicators have well-defined regions dividing the aging scale into low and high values: changes in Municipal Waste by Waste Management Operations and changes in Employment in Technology and Knowledge-intensive Sectors at the national level. The growth rate of these indicators can be linked to a causal relationship with the growth rate of aging.

Classification tree method was used to investigate relations between aging and some tree groups of indicators of sustainable development of EU countries: social capacity, environmental capacity and, economic capacity. The investigation of indicators of social capacity, like Percent of people at risk of poverty or social exclusion and In-

work at-risk-of-poverty rate, revealed that the ability to make a living from work is related to a lower rate of aging and the inability to survive from work is related to a higher rate of aging. The classification by environmental capacity indicators – changes in Municipal Waste by Waste Management (waste) and changes in the Share of Energy from Renewable Sources (energy) – split the data into two classes: Share of Energy from Renewable Sources is less than 1.03 and more. The latter may be associated with a higher growth rate of aging. The classification tree of economical capacity growth rate indicators according to the aging rate consist of four classes. Investigation revealed that countries that are sharply increasing their R&D spending have problems with rapid aging. Countries where people working in the high-tech field is rapidly growing and the expenditure on R&D is growing very slowly – has a high rate of aging. The study shows that the link between aging and sustainable development of EU countries exists even though it is not expressed in a linear causal relationship.

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Ieva MEIDUTE-KAVALIAUSKIENE is a Chief Researcher at General Jonas Zemaitis military academy of Lithuania. She holds a PhD in Technological Sciences (Transport engineering) from Vilnius Gediminas Technical University. She has about 15 years lectures experience (taught such courses as logistic, transport management, supply chain management, warehouse logistics and operations management). Her research interests are related to logistics and supply chain management, formation and evaluation of strategic decisions, decision making. She is an author of more than 50 scientific publications indexed in Web of Science, Scopus, Ebsco, Emerald, and other databases, published several monographs and textbooks. The scientific impact of prof. Meidutė-Kavaliauskienė in: ResearchGate 27, ISI WoS h-Index 10, Scopus h-Index 10. She is a member of the scientific committees of several scientific journals and international scientific conferences.

ORCID ID: orcid.org/0000-0003-0435-7632

Gitana DUDZEVIČIŪTĖ is an associate professor of General Jonas Žemaitis Military Academy of Lithuania, Department of Strategic Management. Research interests: sustainable development, economic growth and its determinants, defence economics.

Gitanos ORCID ID: orcid.org/0000-0002-4891-224X

Nijolė MAKNIČKIENĖ is an associate professor at the Department of Finance Engineering at Vilnius Gediminas technical university. She holds a PhD in social sciences, economics. Research interests – economic forecasting, behavioural finance, investment portfolio as an instrument for resource allocation application in various areas of the economy, artificial intelligence application on forecasting and management of economic processes.

ORCHID ID: orcid.org/0000-0003-2785-5183

Aidas VASILIS VASILIAUSKAS is a Professor of Study and Research Management group at General Jonas Zemaitis military academy of Lithuania. He holds a PhD in Technological Sciences (Transport engineering) from Vilnius Gediminas Technical University. He has about 20 years teaching experience (taught such courses as Transport system, Freight transportation technologies, Logistics). His research interests are related to Transportation, Logistics and Supply chain management. He is an author of around 30 scientific publications indexed in Web of Science, Scopus, Ebsco, Emerald, and other databases, published several monographs and textbooks.

ORCID ID: orcid.org/0000-0002-4547-3966

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THE CONTRIBUTION OF MACROECONOMIC FACTORS IN DETERMINING THE ECONOMIC GROWTH, EXPORT AND THE AGRICULTURAL OUTPUT IN AGRI-BASED ASEAN ECONOMIES

Paitoon Chetthamrongchai¹, Sudawan Somjai^{2*}, Thitinan Chankoson³

¹ Faculty of Business Administration, Kasetsart University, Bangkok, Thailand

² Graduate School, Suan Sunandha Rajabhat University, Bangkok, Thailand

³ Faculty of Business Administration for Society, Srinakharinwirot University, Bangkok, Thailand

E-mails: ¹fbusptc@ku.ac.th; ^{2*}sudawan.so@ssru.ac.th (Corresponding author); ³thitinanc@swu.ac.th

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Abstract. The prime objective of the study can be looked at from the theoretical and practical perspectives thereby predicated on the researcher's strong will to contribute to the body of knowledge by analyzing the economic impact of government spending on agriculture, unemployment rate, and crude oil price in the context of agriculture sector of non-oil for economic growth. Moreover, with the aims to bridge the literature gap in the knowledge of macroeconomic factors on the agriculture in Thailand; since the non-oil export has the potential of growth in terms of sales, profitability, rate of earnings and productivity if the factors militating against the non-oil exports are addressed. The ARDL method is employed to answer the research questions. The findings of the study highlight the fact that this is not only to increase the agricultural sector's contribution to GDP but can also help to cushion the effect of price shocks in the international oil (crude oil) market and promote non-oil export. In addition, to improve the outlook of other non-oil sectors such as the manufacturing sector where agricultural outputs are being required. Thus, important macroeconomic factors like the interest rate, agricultural land, unemployment rate, agricultural export, crude oil price, inflation rate, government spending, openness and exchange rate will be considered in the study.

Keywords: economic growth; agriculture output; macroeconomic factors; Thailand

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JEL Classifications: Q13, Q17

1. Background

Economic growth is a worldwide concern of countries that can be mirrored in country's Gross Domestic Product (GDP). Economic growth is also linked with national economic size of a country. Micro and macro-economic factors can determine economic growth of a country (Meade, 2013; Vigliarolo, 2020). However, GDP is largely influenced by macroeconomic factors which can determine the trend that a country's economy is positioned. Hence it is important to make further investigation of macroeconomic factors on economic growth; for improving and achieving rise in standard of living worldwide. Many macroeconomic factors can be identified as the primary source of economic growth where export is one of the vital factors (Berg & Lewer, 2015). There have been a

considerable number of studies in economic development and growth literature concerning the exports significance as an engine for economic growth. It has been widely acknowledged in theory as well as in practice that exportation leads to several economic benefits for a country. Such as income growth, foreign exchange earnings used to finance imported goods and advancement in technology (Verter & Bečvářová, 2016; Eddelani et al., 2019; Caurkubule et al., 2020). Likewise, export commodity by a country represents one of the important sources of foreign income that ease pressure on balance of payments (BOP) and generate employment. Hence, these economic benefits made exportation significant for both developing and developed countries. Therefore improvement is needed in their outputs for export promotion (Doki, Ochinyabo, & Sule, 2018; Sindhu, Babar, & Abbas, 2018; Zeibote et al., 2019).

Export promotion involves encouraging domestic production for exportation usually by providing incentives for domestic producers. Increasing exports are important not only for developing but also developed economies, since the growth of export has forward and backward links to all sectors in the economy. Many countries have engaged in export promotion strategy far back in 1970 as part of the most proficient gears for growth and development because export has been regarded as a catalyst for the overall economic development (Amado & Mollo, 2015; Danylova & Kats, 2019; Keho, 2017). The ASEAN countries accounts for the 11 percent of world's agriculture output (see figure 1).

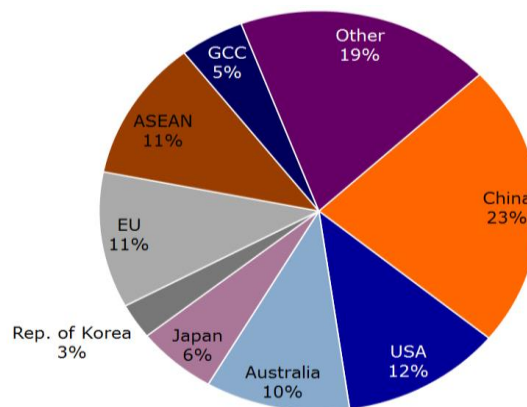


Figure 1. The agriculture output (country and region)

Evidences by most economists based on the 1970s and 1980s experiences assumed that good macroeconomic policies are essential and adequate for the achievement of sustainable growth in the long run. Hence, macroeconomic factors which consists of fiscal, monetary and trade policies influence economic growth. Since all the policies (fiscal, trade and monetary) are interdependent, macroeconomic policies can therefore be defined as policy mix. Thailand as an example of a developing nations has embraced various policy mix in the means of improving the overall feasibility of the country's economy performance. Although several policies are being designed by the government to improve Thailand 's economy as a whole, some policies often have causal and detrimental effects on output growth. For instance, the falling of global commodity price and increasing of world crude prices of recent have become more challenging for government in stimulating the economy without endangering macroeconomic stability (Gilpin, 2018). Hence, associate the improvement of macroeconomic factors to be anchored to the nations' growth. The five countries used as a sample of the study accounts for 95 percent of ASEAN's GDP (see figure 2).

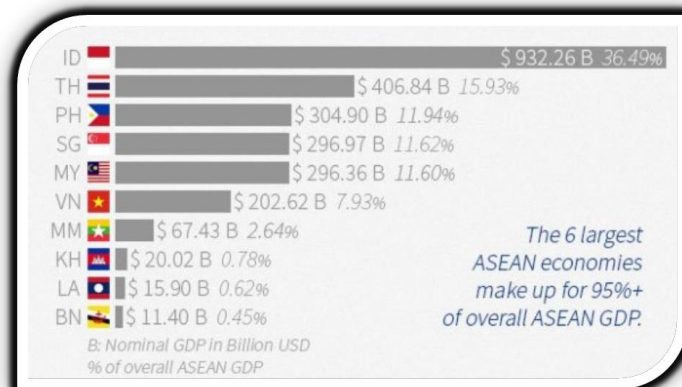


Figure 2. The share of each ASEAN country in aggregate ASEAN GDP

Source: World Bank

Furthermore, the international financial crisis which began in 1997 continues to affect the external trade of agricultural sector. In the case of Thailand, changes in macroeconomic factors such as exchange rate improved the agricultural sector performance. Likewise, Adekunle and Ndukwe (2018) observed that changes in exchange rate, interest rate and other macroeconomic factors have considerable impact on Thailand's agricultural sector. However, the downward trend of agricultural sector revealed can be ascribed to the influences of some of these macroeconomic factors. Hence, making investigation on macroeconomic factors crucial for future performance of the economic growth of nations and also agricultural sector. This is not only to increase the agricultural sector's contribution to GDP but can also help to cushion the effect of price shocks in the international oil (crude oil) market and promote non-oil export. In addition, to improve the outlook of other non-oil sectors such as the manufacturing sector where agricultural outputs are being required. Thus, important macroeconomic factors like the interest rate, agricultural land, unemployment rate, agricultural export, crude oil price, inflation rate, government spending, openness and exchange rate will be considered in the study. Despite exportation in developing countries have been proposed to enhance revenue and usher in economic growth and development (Berg & Lewer, 2015; Esu & Udonwa, 2015) diversity of Thailand's exports base can still be identified to give a better way of achieving economic growth (George-Anokwuru, 2018). More so, potential access from export encouragement through macroeconomic factors could be considered, as successful development relies upon policies.

Furthermore, for critical addressing of problem militating subsectors of non-oil performance in view of the fact that "oil is an exhaustible asset", sectoral analysis is necessary which few studies have examined. This thereby raised the needs for investigating the sectoral components of non-oil such as agriculture for proper managing and improvement through some macroeconomic policies by the government that will aid its output and exportation. Similarly, agriculture has been concluded to be an engine of economic growth and development through its important roles like serving as other raw products for other non-oil sectors, basis of food to man, poverty reduction in most nations (Luca, Cionga, & Giurca, 2013; Oluwatoyese & Razak, 2016) and constituting the largest share of the nonoil with limited work facilitate the direction for this study. Hence impact of inflation rate, crude oil price, unemployment rate, government spending on agriculture, SAP, exchange rate and agricultural land on the economy are being examined for better output growth and positioning of diversity in export base.

The quest for this study can be looked at from the theoretical and practical perspectives thereby predicated on the researcher's strong will to contribute to the body of knowledge by analyzing the economic impact of government spending on agriculture, unemployment rate, and crude oil price in the context of agriculture sector of non-oil for

economic growth. Moreover, with the aims to bridge the literature gap in the knowledge of macroeconomic factors on the agriculture in Thailand ; since the non-oil export has the potential of growth in terms of sales, profitability, rate of earnings and productivity if the factors militating against the non-oil exports are addressed. Likewise, Sindhu et al. (2018) concluded that stabilization economic policies that will boost export promotion and productivity should be sustained and implemented; in wise of government policies stimulating agricultural productivity being examined. This will be of important for policy making in developing countries of the world especially Thailand for the design of macroeconomic policies in order to promote export through the aid of the agriculture sector; whereas leading towards improvement in economic growth. Likewise, since the role of agriculture in transforming the economy cannot be overstressed by serving as the source of food for human and animal and provides raw materials for industrial sector. More so playing a significant role in the reduction of poverty of nations (Rashwan, Ragheb, & Bary, 2018), therefore calls for enhancing agricultural sector performance. Also, the research study must be able to explain succinctly components of non-oil in Thailand n growth; so as to be able to examine the structure and policies needed to be put in place as regarding to the improving of the country's agricultural sector.

2. Literature Review

Literature on economic growth concept has been explored which make this study to agree with the definitions of Meade (2013), Lewis (2013). The study acclaims that economic growth is the increment in consumption of services and goods and its production, and it's mirrored in country's gross domestic product (GDP). The effect of micro and macro-economic factors such as GDP per capita to be positive, zero and negative with a nation's economic growth. He asserted that there is positive economic growth effect if the macro-economic factors are found to be higher than the country population growth. Zero economic growth occurs when these factors are equal to the population growth whereas negative economic growth is obtained when population growth are higher than these factors. Assertion supported Barro (2016) conclusion that economic growth has a significant relationship with a country's resources, infrastructure development, institutional development, government intervention and culture. Lincényi and Čársky (2020) emphasized importance of trust in public policy. However, Bagli and Adhikary (2014) argued that one of the factors that also face economic growth is population growth. Therefore, past works were reviewed with consideration on few macroeconomic factors on economic growth that are necessary in this study.

Exchange Rate

Fariditavana (2016) measured the impacts of the real exchange rate (RER) on the balance of payment (BOP) using structural cointegrating vector autoregressive distributed lag (VARDL) models for local and international output. Eight organization for economic cooperation and development (OECD) nations with small structures were estimated to examine long-run relationship. The impulse response functions (IRF) were summed to study the response to shocks, showing an indication of J-effects curve; that is worse off of the country's trade deficit at the start of its currency's depreciation. The estimation used a single-equation autoregressive distributed lag (ARDL). The outcomes suggested that the maximum likelihood condition is satisfied in the long run, despite the considerable heterogeneity discovered.

Scott (2015) deliberated on exchange rate strategy, in relation to Chinese financial and capital control reform; using general regional equilibrium of input-output for empirical results. The results signify that there are other options to renminbi/dollar appreciation strategy in managing US China tenacious trade deficiency ought to be given. In this way, offering another and exact based arrangement suggestion in managing the US exchange shortage with China was made. Likewise, Habib, Mileva, and Stracca (2017) examined how a high RER stimulates economic development for developing countries. The finding used different estimation techniques and RER measurements, because of its robustness in nature. The results suggested that tradable suffer excessively from the government failures that keep poor countries from uniting toward countries with higher incomes; while

official model clarified relationship between RER and economic appreciation. Since linkage between exchange rate and economic development exist in developing nations, therefore existence is obvious in most ASEAN nations.

Mohsen (2015) studied effect of exchange rate, inflation rate and interest rate on the non-oil sector as whole. Their study concluded that non-oil export was said to have progressive outcome on economic development; thereby recommended that increase in production of agricultural and manufacturing sectors have to be ensured for product availability in both domestic and export purposes. Adegboy (2019) examined the relationship between the country's RER and domestic output growth. The study adopted the error correction model technique and found that there is no co-integration between RER and other explanatory variables on the long run. The study revealed that RER is to operate through aggregate supply chain, which can enhance output expansion and economic expansion at large in Thailand. Therefore, the study suggested that, there is need to use real exchange rate as one of the macroeconomic policies to assist an economy.

Interest Rates

Another macroeconomic factor that influences economic growth greatly is interest rates. Bodenstein, Erceg, and Guerrieri (2017), stated that interest rate is the annual price charged from a borrower on a loan and it's express as percentage of the total loan. Bruno and Shin (2015) assert that it's the profit over a period of time which is gotten from financial instrument. It can also be view as the difference in money back and money initial given over a period of time. The interest rates phenomenon explains how commercial banks make their revenue and which is found have influence on a country's economy. Author investigated the determinants of huge capital flight along with its constraints on economic growth. The study analysed the capital flight of Thailand in a new context by different innovative model and econometric techniques. This study was carried out with use of the ordinary least squares (OLS) and the error correction model (ECM). The study found that interest rate causes capital flight in both Thailand's short and long run; while exchange rate depreciation significantly increases capital flight. Output growth in the short run was significant and negative, indicating that non-active home resources can trigger capital flight.

Inflation Rate

Inflation is another major macroeconomic factor that influences economic growth. It can be explained as the annual continuous inflation in product's price and service in the country's unit of currency (Maravalle & Rawdanowicz, 2018). It is an annual rate that is reflected in a country's price of good and services which directly influence the country index of money prices. Scholar pointed out that inflation rates indicates that there is continuous fall in the total purchase power of a country's monetary system and its effect will be directly felt on the country's economic growth. Also, non-considered fact was assumed, whereas flexible exchange rate era with inflation aiming, showed that inflation would have been reduced, but interest rate instability would have been amplified.

Similarly, Bon (2018), examined "long-run relationships and threshold effects between Mexico's inflation and economic growth". Employing cointegration technique, they found that there exist significant and undesirable long-run association between inflation and economic progression. Their result also observed high level of inflation produce a destructive effect on economic development which is consistence with other studies. In Africa, Hassan and Nassar (2017) observed whether inflation causes South Africa's growth. Employment rate was incorporated into the model as variable affecting both inflation and economic growth, so as to address the problem of omitted variable associated with some previous studies. A bidirectional causal relationship was found between inflation and economic development in South Africa by using ARDL approach. Likewise, in Thailand, Obi, Yuni, and Ihugba (2016) carried out a study on economic growth and inflation. Consumer price index (CPI) and GDP were used as a substitute for inflation and economic development respectively using cointegration and

causality test. No co-integrating existence was discovered variables for the period. VAR-Granger causality also resulted at unidirectional causality running from inflation to growth. It was stated that inflation has no good impact on growth and the fact was maintained in the case of country with high inflation.

Unemployment Rate

The ratio of the labor force within a country is referred to as employment and is one of the leading macroeconomic factors that influence a country's economic growth. Similarly, Cylus, Glymour, and Avendano (2014) explained unemployment rate as the measurement of employable force within a country's workforce which is expected to be 16 years and above and the unengaged force (either those that have lost their job or/and unable to secure a job within last one month). It is a fact that when there is positive economic growth in a country then it be influential on the employment rate of the citizen. There is an affirmative association between India's growth and employment rate which supported Keynesian theories. He concluded that increment in fiscal development will lead to an increase in the employment ratio of a country.

Chand, Tiwari, and Phuyal (2017) examined the effect of unemployment rate on GDP alongside with macroeconomics variables such as government deficit spending, interest and inflation rate. It was discovered that government deficit spending and unemployment rate has a negative effect; while inflation and interest rate had no significant effect on GDP. More recently, the interdependence in national labour markets in Central America, by constructing two sets of panel data. Vector Auto Regression (VAR) models that included the economic growth, investment, and unemployment rates; and export ratios in place of the investment rates are used for estimation. Likewise, Kashi and Tash (2014) analysed impact of inflation, unemployment rate and government expenditure on poverty level in Iran. The study revealed that unemployment and inflation have positive impact on poverty; whereas government expenditure has no tangible effects on poverty.

The forecasts accuracy of some macroeconomic variables in Romania. ARIMA models were used for prediction of the inflation and the unemployment rate, while it was concluded that the unemployment forecasts were better than the naïve predictions and the static prognosis were superior to the dynamic. Kaas and Kircher (2015) examined two-country and sector model whereas one sector produces homogeneous products and the other differentiated products for trade. The relationship of labour market rigidities and trade weaknesses in repositioning welfare, trade flows, productivity, and unemployment are also studied. The opening to trade increases rate of unemployment for a country if relative labour market frictions in the differentiated sector are low and otherwise. Unemployment rates of cross-country differences display rich patterns, this will be evident in ASEAN particularly Philippines.

Government Spending

Government is the consultant of a country's economic and her activities directly or indirect determine the state of the country's economic growth. Government spending is another important macroeconomic factor that greatly influences economic growth. It deals with government attitude, actions and policies on the country's daily spending and trade. Impact of growth in relation with various spending programmes of government's share on GDP in 28 developing economies. The result found that per capita GDP growth rely on improvement of per capita government health costs, per capita government expenses on education, population growth, share of total health expenditure and gross capital formation. Recommendation was given based on the statistical results that it will be of help for the policymakers; once their government expenditure places in order to stimulate economic growth. Additionally, identified government financial discipline as important fraction in a country's economic growth. Similarly, Kandogan and Johnson (2016) examined the impacts of fiscal freedom reduction that is taxing and spending parts on economic growth. Panel two stage least squares estimation set for the OECD nations was used for analysing. Nominal interest rates, federal government budget deficits and other factors are variables utilized. The result revealed that fiscal freedom direction leads to same way on economic growth; likewise, freedom from

excessive government size. Also concluded that open trade policies, public and private investment, human capital and government spending were factors militating OECD countries economic evolution. He advocated that for these countries to experience desire economic growth their government must pay close attention to their taxation, government spending and public and private sector development. Urbano, Aparicio, and Audretsch (2019) also argued that economic growth can be enhanced by venture and entrepreneurship capitals. Another that only active venture and entrepreneurship capital enhances economic growth. This infers that venture and entrepreneurship capital is part of the macro-economic factors that contribute to economic growth. Many of these studies were done in Europe and America whereas that there are differences in Africa economic growth factors and the westerners due to long military rule and corruption which is characterized by Africa countries history. They further identified negative spending of the military as a factor militating against economic growth in Africa. This was supported in Ghana that only when Africa countries can abolish military coup, military rule and extreme political mayhem that the continent can experience sustainable economic growth.

Scholar examined the tendencies in government spending in the emerging countries by analysing the factors that influence change and build a framework for defining the different effects of several government expenses on economic development. It is found that all sectors do not receive equal treatment, but SAP increased the size of government spending which was contrary to the general belief. The influence of numerous types of government expenditure on economic growth was also found to be mixed based on Africa, Asia and Latin America context. In ASEAN, promoting economic growth was acknowledged to be strongly supported by government expenditure on agriculture and health; Investments in defense, agriculture and education had positive effects on promoting growth in Asia; while in Latin America, all forms of government expenditures were said to be significant except health expenditure which is found to be insignificant. It was concluded that SAP influence development in Latin America and also in Asia but impeded growth in ASEAN where poverty alleviation solely depends on enhancement of agricultural production with Thailand as a good example. Kargi (2016) investigated “consequence of government spending on the growth from periods of 1980 to 2011. Study adopted the ARDL approach and the deviation from their equilibrium trail. Their results found that government periodic expenses is positively correlated to economic development, whereas affirming the validity of Wagner’s law: that states that “increase in responsibilities of any state leads to increases in the economy size in the short and long run”. Therefore, it was advised that government should ensure that capital outlay and periodic expenses are well managed appropriately in a way that will boost productive capacity as it will influence the rapid of the growth rate of Thailand economy.

Export

The beginning of literature on economic growth and export can be traced back to 1970 where many studies (Feddersen, Nel, & Botha, 2017) used correlation coefficients to analyze relationship between economic growth and export. While in 1980s uses Granger causality methodology to further determine lead and lag relationship. In the 1990s scholars employed the combination of causality test, unit root and cointegration to deeper the understanding of the phenomena. It can be observing that majority of studies support the notion that export positively influence economic growth, however there are some differ options to the notion.

For instance, different studies supported the notion that export positively influence economic growth whereas disagreed with the notion that export positively influence economic growth. These studies findings were recently capture by Dreger and Herzer (2013) that there is no perfect conclusion on the influence of export to economic growth. They observed that it depends on government operation policies. This observation was pointed out that there are possible for economic growth to create inflation pressure leading to low export. Likewise, it is possible for it to produce high interest rate which will also lead to low export. However, they noted that economic growth can boost export if exchange rate favors the country and there is more money in circulation to increase

productivity (Pamornmast, Jermstittiparsert, & Sriyakul, 2013a, 2013b; Jermstittiparsert, Pamornmast, & Sriyakul, 2014).

Amado and Mollo (2015) in his study titled rise and fall of export-led growth (ELG) maintained that ELG causes specialization which enhances productivity of goods and services. The output of productivity is transformation from non-performing trade sector to performing sector. Hence when productivity is positive, and the sector becomes performing then it leads to economic growth. Likewise, that export-led growth enables exporting countries to have more opportunities of manufacturing more goods which open their local market for foreign benefits. This also influences their technological drives and promotes inter-industrial trade. Therefore, export is a vital factor that leads to technological change and economic growth if it's position properly. There is a huge impact of labor market, non-oil exports, physical and human capital stock and import tariffs on Iran's economic growth. They further argued that free trade is an important factor of economic growth.

Study described these mixed findings in two ways, the first was a group of studies using cross-country analysis (Khan & Abasyn, 2017; Yang & Mallick, 2014) whereas the second group used single country analysis. He concluded by pointing out that for developing countries to experience sustainable economic growth then there is need to limit their heavy dependency on export of raw on unfinished goods. This is because slight changes in international market will directly affect primary goods which will affect producing countries especially developing countries. This conclusion is similar to Dar and Amirkhalkhali (2017) declaration that the link between export and growth indicates that inward oriented countries should be cautious on policies and practicing strategies. Scholar in Iran suggested that export positively influence economic growth due to net increase in GDP. He revealed that although oil export is playing a significant role in Iran's economic growth now however, the manufacture exports will cause the further economic growth for the country. This finding was further explored when he resolved that there is significant affiliation among export, exchange rate and growth. A similar conclusion was made recently when he extended model by integrating government consumption. He suggested the notion that there is optimistic influence amid government consumption, export and growth.

Agriculture

While some studies argued that agriculture plays a passive contribution to economic growth. This argument was based on the fact that agriculture provides platform for industrialization and resources. Majority of raw materials inputs needed for advancement both in industries and technology relies on agricultural output. Also, it creates wealth and employment for the normal masses of the country. Hence, these studies concluded that agriculture has a passive role on economic growth. The other arguments counter this position and suggest that agriculture plays a vital and active role on economic growth (Oluwapemi, 2017). It is more like a market on its own than provision of raw resources and material input for productivity and industrialization of a country. In fact, it could be seen that many subsectors like technology and manufacturing benefit greatly from agriculture which means all these sectors inter-dependent on each other. Thus, these two arguments imply that there is disagreement on the true role of agricultural sector on economic growth especially in ASEAN where there are abundant opportunities for agricultural activity. Although, many studies have explored different approaches and method in determining the true position of agricultural sector to economic growth and likewise outlined the theoretical relationship between the two. However, a study maintained that many of the previous studies do not provide conclusive output and position on the impact of agriculture to economic growth. They thereby use conventional regression techniques for their findings. Hence, their finding is inconclusive. Another major study that explains the role of agriculture in economic growth was done. He made two unique arguments that agriculture greatly influences GDP and non-agricultural sector has a little influence on agricultural sector growth. This finding is consistency with Oluwatoyese and Razak (2016) reveals that out of the four foreign sectors namely agricultural, investment, non-investment and social infrastructure.

Agriculture sector remains the only sector that positively contributed to economic growth. More recently LUCA et al. (2013) concluded that agricultural sector is one of the major contributions to Romania's economic growth. They argued that farm products and commercial farming are the major factors influencing the economic growth in Romania. Specifically, author pointed out Thailand agriculture sector as a major boost to her economic growth out of all the ASEAN countries. However, calls for in-depth investigation on problems militating against the sector. Researcher highlighted that Thailand government neglect on agriculture sector over oil sector will create a big problem for the country in the future. Hence, he advocated for the need to redirect the country attention to both encompass agriculture and oil for sustainable development of the country.

Furthermore, Oluwatoyese and Razak (2016) maintained that agriculture is the only engine of development that Thailand government can relies on because there are indications that oil sector might crashed. This is the reason why the sector should be well funded and serviced to reduce the mono-cultural dependence on the oil sector. This point supported argument that there is need for Thailand government to increase her budgetary allocation to agriculture section to create a way for the country industrialization and employment. These positions were similar to that there is drop in the influence of agriculture to Thailand 's growth particularly during the oil boom period till now. Hence, this study will investigate the role and influence of agriculture export to economic growth in Thailand.

Oil Price

Author examined the impact of oil price shocks on Thailand macroeconomic variables using VAR. The study found that oil prices have significant impact on real GDP, money supply and unemployment; while no significant impact on consumer price index. The need for diversification of the economy to minimize the consequences of external shocks is thereby suggested. Similarly, posed a huge challenge on Thailand government. They observed that the total dependence on oil to generate over 80% of Thailand revenue will negatively affect the country when there is fall in oil price or oil consumption. Export of manufacturing, agriculture and human capital were suggested to reposition the country for future economic growth. This suggestion supported that there is need for Thailand government to diversify her economy and export beyond oil toward solid minerals and agriculture. Also study focused on oil price changes or shock and industrial production relationship used as proxy for economic development. Real exchange rate as one of macroeconomic variables was being analysed by VAR model. Insignificant and indirect statistical effect of prices of oil on production of industry. Once oil price shock affects real exchange rates, industrial production will be affected. However, the results implied increase in industrial production is not as an increment in prices of oil. In another major study Tiba and Omri (2017) examined energy consumption and economic growth relationship. Electricity demand, domestic crude oil consumption and gas utilization are used for the estimation, which are identified as energy consumption's proxies. A long run relationship existed among the series. Furthermore, electricity consumption, domestic crude oil production and gas utilization were found to have unidirectional causality with economic growth. Causality runs from two (gas utilization and electricity consumption) of the proxies used to economic growth as well as from economic growth to domestic production of crude oil. It was therefore concluded that economic growth will be harm by consumption of electricity and gas according to their conservation policy whereas domestic consumption of crude oil regarding policy won't harm (Hussain et al., 2019).

Another study measures of oil value shocks through utilization of previous studies with the perception to determine the degree to which decisions about the petroleum value development definition rely on upon the meaning of the definition of shocks adopted. The study was the pioneering attempt to introduce effects of threshold into shocks of oil price and output linkage. Their findings suggested that oil cost shocks did not justify tangible development in total macroeconomic aggregates, even with the introduction of brink effects. The threshold effects were discovered as weak linkages with the nature of Thailand 's petroleum. The study therefore, concluded that spending of oil income profitably is vital if positive impact on genuine output development is

anticipated. Similarly, investigated on oil revenue, institutions and macroeconomic indicators such as institutional quality index, money supply, fiscal deficit, inflation, conversion and interest rate over period of time. It was observed that both economic and political strategies are required for managing oil windfalls.

3. Model specification

For theoretical specification, growth production model based on Solow (1956), the model in equation 1 is re-presented in equation

$$ECG_t = A_t F(K_t, L_t) \dots \dots \dots (1)$$

here ECG denotes aggregate output (GDP), A is level of technology, K is capital and L is labor. Equation 2 can also be expressed as the neoclassical aggregate production function where physical capital (K), human capital (H) and labour (L) are used as inputs for the generalized production function, that is added to equation 2 Schuh (1974) amended the aggregate output (GDP) model in equation 2 as follows:

$$ECG_t = F(f_T(La, K_{La}), f_K(K_L, L)) \dots \dots \dots (2)$$

Where, La is land, which was included into the model, K was put into consideration through the use of KLa and KL. KLa is land augmented capital (biochemical), KL is labour augmented capital (machinery). The KL relates to the H earlier stated. The level of technology that was denoted by A in equation 2 was examined to have been captured by the labour augmented capital which is referred to as machinery (KL). The second model is the framework, where the economy was assumed to consist of two sectors: export and non-export, denoted by X and N respectively. Each of the sectors are presented to have different production functions with the incorporation of A, K and L as factors to produce output. The Feder's model thereby extended the production function by including X and N into equation 3. In addition Al-Yousif (1997) re-modified the output model of equation 3 with the inclusion of X and other factors to be responsible for the aggregate output model as indicated in equation 3. In equation 3, L and K remain in the model with the addition of X as export level, Gas government expenditure and T as terms of trade. The level of technology denoted by A in equation 1 that was captured in equation 2 as KL is still retained in equation 3. This is being represented by K

$$ECG_t = f(L, La, K, N, X, G, T) \dots \dots \dots (3)$$

Furthermore, Akinbobola and Oyetayo (2010) examined domestic output growth with real exchange rate (Ex). Likewise, investigated on GDP with Ex and other macroeconomic factors such as unemployment rate (Une), government deficit spending (G), interest rate (Int) and inflation rate (Inf). Therefore, the output model as in equation (4) can be expanded as thus:

$$ECG_t = f(La, Une, Ex, Inf, Int, K, N, X, G, T) \dots \dots \dots (4)$$

where Une is considered to replace the L. Ex and interest rate (Int) relate based on monetary policy that is associated with K in equation 4.3. Inf is often considered as a determinant of the exchange rate, which justified the reason for the addition in equation 4.4. This is as a result of an increase in G, leading to increase in output (GDP) and then tends to reduce interest rate (Int). This thereby implies that higher K puts the pressure of interest rate (Int) downward. This study identifies agricultural export (AGRE) as an export item, therefore substituting AGRE for X. Agricultural output (AGROU) and crude oil price (CROP) as non-export item by replacing N with AGROU and CROP. However, to achieve the second objective which is to examine the impact of macroeconomic factors on economic growth; equations from 4.2 to 4.3 are modified. Likewise, in line with equation 4 this study presents equation 5 to examine the second objective, which considered the addition of crude oil price and agricultural export to the economic growth equation.

$$ECG_t = f(Une, Ex, Inf, Int, AGRE, AGROU, CROP) \dots \dots \dots (5)$$

Likewise, for agricultural output model equation 6 was adapted, where GDP can be equal to agricultural output. The macroeconomic factors affecting output model can also be linked to be affecting agricultural output, as stated from equation 1 to 4. Therefore

$$AGROU_t = f(La, Une, Ex, Inf, Int, K, N, X, G, T) \dots \dots \dots (6)$$

The relationship between agricultural land and agricultural output growth in this study is based on Schuh (1974) model in equation 2. However, the relationship between government spending and agriculture is based on Ram (1986) framework. Ram's framework is based exports and output growth model. Also a model which followed Ram (1986) assumed that the economy consists of government (G) and non-government (C) sector. This model is represented by equation

$$AGROU_t = f(Une, Ex, Inf, Int, AGREL, CROP, AGS, SAP, Op) \dots\dots\dots(7)$$

Equation 7 however, links agricultural output to some of the macroeconomic factors (Ex, Int, Une, Inf and Op) associated with output in addition with new variables. Introduction of new variables such as agricultural land (AGRELL), SAP, crude oil price and government spending on agriculture (AGS) was made in an attempt to answer the stated third objective. Moreover, to achieve the fourth objective on investigating the impact of CROP, SAP and AGS on agricultural export, this study follows the theoretical specification in consider agricultural export as dependent variable. Author simplified the agricultural export model as follow

$$AGRE_t = f(EXR, FAROP, Op) \dots\dots\dots(8)$$

where FAROP is the farm output prices, Ex is the exchange rate and Op is openness. Also, Ali, Abou-Mesalam, and El-Shorbagy (2010) considered exchange rate (EXR), interest rate (Int), inflation rate (Inf) and money supply (M) to determine agricultural export as indicated in equation 9

$$AGRE_t = f(EXR, Int, Inf, M) \dots\dots\dots(9)$$

However, based on equation 8 and 9, agricultural export in this study will be determined with equation 4.10 with the inclusion of variables such as CROP, SAP and AGS. The relationship between agricultural export and government spending on agriculture is based on export supply function, therefore AGS is used to replace M in equation 9. Hence, the FAROP in equation 8 was represented by CROP. SAP is a policy made by the government.

$$AGRE_t = f(EXR, Int, Inf, SAP, CROP, AGS, Op) \dots\dots\dots(10)$$

In an attempt to determine the relationship between dependent and independent variables in Thailand, models are specified as:

$$ECG_t = a_0 + a_1 EXR_t + a_2 Int_t + a_3 Inf_t + a_4 AGREL_t + a_5 Une_t + a_6 CROP_t + a_7 AGROU_t + \varepsilon_t \dots\dots\dots(11)$$

$$AGROU_t = a_0 + a_1 EXR_t + a_2 Int_t + a_3 Inf_t + a_4 AGREL_t + a_5 Une_t + a_6 CROP_t + a_7 AGS_t + a_8 SAP_t + a_9 Op_t + \varepsilon_t \dots\dots\dots(12)$$

$$AGRE_t = a_0 + a_1 EXR_t + a_2 Int_t + a_3 Inf_t + a_4 Une_t + a_5 CROP_t + a_6 AGS_t + a_7 SAP_t + \varepsilon_t \dots\dots\dots(13)$$

ARDL is a method developed for the cointegration analysis by Pesaran and Shin (1998). It is applicable regardless of the stationarity of variables; that is variables mainly I (0) or I (1) and with mixed results are used. In terms of the number of variables, more are required than in VAR models. It allows for identification of long-run and short-run changes on the dependent variable. The ARDL based method yields a consistent estimation of the long-run coefficients that are asymptotically normal. It could be relied on when using small samples for estimation and hypotheses testing on the long-run coefficient. The pretesting problem that is indirectly involved in the cointegration analysis can be avoided by the ARDL approach. There is no priori exogenous and endogenous division of variables in the model. Likewise, zero restrictions are not forced and no strict theory of economic in which the model is developed. In addition, a dynamic ECM can be derived from this approach through a simple linear transformation. However, to illustrate ARDL model approach, this model is considered.

$$\begin{aligned} \Delta ECG_t = & \frac{a_0}{\mu(1)} + a_1 EXR_t + a_2 Int_t + a_3 Inf_t + a_4 AGRE_t + a_5 Une_t + a_6 CROP_t + a_7 AGROU_t \\ & \frac{1}{\mu(1)} \sum_{i=1}^{m_1-1} a_1 \Delta EXR_{t-1} + \frac{1}{\mu(1)} \sum_{i=1}^{m_2-1} a_2 \Delta Int_{t-1} + \frac{1}{\mu(1)} \sum_{i=1}^{m_3-1} a_3 \Delta Inf_{t-1} + \\ & \frac{1}{\mu(1)} \sum_{i=1}^{m_4-1} a_4 \Delta AGRE_{t-1} + \frac{1}{\mu(1)} \sum_{i=1}^{m_5-1} a_5 \Delta Une_{t-1} + \frac{1}{\mu(1)} \sum_{i=1}^{m_6-1} a_6 \Delta CROP_{t-1} + \\ & \frac{1}{\mu(1)} \sum_{i=1}^{m_7-1} a_7 \Delta AGROU_{t-1} + \varepsilon_t \dots (13) \end{aligned}$$

$$\begin{aligned} \Delta AGROU_t = & \frac{a_0}{\mu(1)} + a_1 EXR_t + a_2 Int_t + a_3 Inf_t + a_4 AGREL_t + a_5 Une_t + a_6 CROP_t + a_7 AGS_t + a_8 SAP_t + a_9 Op_t \\ & \frac{1}{\mu(1)} \sum_{i=1}^{m_1-1} a_1 \Delta EXR_{t-1} + \frac{1}{\mu(1)} \sum_{i=1}^{m_2-1} a_2 \Delta Int_{t-1} + \frac{1}{\mu(1)} \sum_{i=1}^{m_3-1} a_3 \Delta Inf_{t-1} + \\ & \frac{1}{\mu(1)} \sum_{i=1}^{m_4-1} a_4 \Delta AGREL_{t-1} + \frac{1}{\mu(1)} \sum_{i=1}^{m_5-1} a_5 \Delta Une_{t-1} + \frac{1}{\mu(1)} \sum_{i=1}^{m_6-1} a_6 \Delta CROP_{t-1} + \\ & \frac{1}{\mu(1)} \sum_{i=1}^{m_7-1} a_7 \Delta AGS_{t-1} + \frac{1}{\mu(1)} \sum_{i=1}^{m_8-1} a_8 \Delta SAP_{t-1} + \frac{1}{\mu(1)} \sum_{i=1}^{m_9-1} a_9 \Delta Op_{t-1} + \varepsilon_t \dots (14) \end{aligned}$$

$$\begin{aligned} \Delta AGRE_t = & \frac{a_0}{\mu(1)} + a_1 EXR_t + a_2 Int_t + a_3 Inf_t + a_4 Une_t + a_5 CROP_t + a_6 AGS_t + a_7 SAP_t + a_8 Op_t \\ & \frac{1}{\mu(1)} \sum_{i=1}^{m_1-1} a_1 \Delta EXR_{t-1} + \frac{1}{\mu(1)} \sum_{i=1}^{m_2-1} a_2 \Delta Int_{t-1} + \frac{1}{\mu(1)} \sum_{i=1}^{m_3-1} a_3 \Delta Inf_{t-1} + \\ & \frac{1}{\mu(1)} \sum_{i=1}^{m_4-1} a_4 \Delta Une_{t-1} + \frac{1}{\mu(1)} \sum_{i=1}^{m_5-1} a_5 \Delta CROP_{t-1} + \frac{1}{\mu(1)} \sum_{i=1}^{m_6-1} a_6 \Delta AGS_{t-1} + \frac{1}{\mu(1)} \sum_{i=1}^{m_7-1} a_7 \Delta SAP_{t-1} + \frac{1}{\mu(1)} \sum_{i=1}^{m_8-1} a_8 \Delta Op_{t-1} + \varepsilon_t \dots (15) \end{aligned}$$

4. Results

The results of the correlation test between dependent variable and independent variables proved to be very useful in pre estimation analysis especially as regards potential relationships suggested by theories. Therefore prior to the econometrics analysis, the statistical correlation of the variables are examined which helped in determining the statistical relationships between and amongst the variables. See Table 1 below.

Table 1. Correlation Analysis

		1	2	3	4	5	6	7	8	9	10	11
ECG	1	1										
EXR	2	0.830**	1									
Int	3	0.257**	0.243**	1								
AGROU	4	0.810*	0.118**	0.829*	1							
Inf	5	0.145**	0.463*	0.129	0.579*	1						
AGREL	6	0.130*	0.247**	0.828	0.674*	0.882	1					
Une	7	0.234**	0.323**	0.212*	0.214*	0.352*	0.653*	1				
CROP	8	0.342**	0.091**	0.052*	0.541*	0.152*	0.109*	0.899*	1			
AGS	9	0.621**	0.111**	0.321*	0.271*	0.111*	0.231*	0.112*	0.059*	1		
SAP	10	0.190**	0.101**	0.871*	0.321*	0.761*	0.271*	0.828*	0.674*	0.882	1	
Op	11	0.982**	0.301**	0.901*	0.391*	0.871*	0.222*	0.829*	0.271*	0.129	0.829	1

Table 2 summarize the results of GDP, agricultural output and agricultural export models respectively based on the selected ARDL models. An ARDL (1, 0, 0, 1, 1, 1, 0, 1) was chosen for the GDP model. The results of R2 (78.7%), the adjusted R2 (65.9%) in Table 5.6 along with the F-statistic for GDP equation model show that the

model obtained best goodness of fit and variations of the selected independent variables explained certain the changes of the dependent variable. The significance of the F-statistics test justifies the inclusion of all the explanatory variables existing in the GDP model.

Table 2. Optimal ARDL Model Selection

Variables	Coefficients	Standard Error	<i>t</i> -statistics	<i>p</i> -Value
Model 1: ARDL (0,0,0,0,0,1)				
EXR	0.415	0.142	2.922	0.008*
Int	0.455	0.147	3.090	0.006*
AGROU	0.000	0.000	2.427	0.024*
InT	0.000	0.000	5.938	0.000*
AGREL	-0.477	0.137	-3.498	0.002*
Une	0.001	0.001	2.202	0.003**
CROP	0.023	0.043	3.526	0.000
CROP(-1)	0.065	0.037	1.763	0.092**
C	7.406	2.882	2.570	0.018*
T	0.045	0.009	4.731	0.000***
Model 2: ARDL (10,0,0,0,0,0,0)				
EXR	0.425	0.183	2.327	0.001*
EXR(-1)	0.340	0.173	2.959	0.005**
Int	0.000	0.000	3.401	0.007**
AGREL	0.000	0.000	4.338	0.000*
Une	-0.428	0.195	-2.201	0.040*
CROP	0.045	0.056	2.915	0.031*
Inf	0.033	0.057	3.570	0.005**
AGS	0.103	0.062	4.675	0.000**
SAP	0.033	0.048	3.689	0.021**
OP	0.097	0.053	2.831	0.083**
C	11.399	5.234	2.178	0.042*
T	0.070	0.023	2.992	0.007*
Model 3: ARDL (0,0,0,0,0,0,0)				
EXR	0.429	0.118	3.624	0.001*
Inf	0.000	0.000	4.158	0.000*
CORP	0.000	0.000	1.902	0.070**
Int	0.000	0.000	-3.352	0.003*
Une	-1.214	0.380	-3.194	0.004*
AGS	-0.291	0.076	3.854	0.001*
SAP	0.418	0.113	3.709	0.001*
C	25.974	6.203	4.188	0.000*

Table 2 reveals that almost all the coefficients of the regressors included in the specified model happens to be significant at a point in time except for exchange rate, government spending on agriculture, SAP, a year lagged of openness and agricultural land having negative signs and insignificant. The R² (97.7%) and adjusted R² (89.7%) values suggest that the model has a high explanatory power. The one year lagged dependent variable that is agricultural output for the country was found to be statistically significant implying that the preceding year's output does influence the current nation's output. An ARDL (2, 2, 2, 0, 2, 2, 2) model was selected for

agricultural export. Table 2 shows the results of the ARDL estimates for agricultural export model. Nearly all the variables are statistically significant with expected signs. A year and 2 years lagged dependent variable that is agricultural export for the nation was found to be significant implying that past years' export does influence the current nation's export. The R² (87.5%) and adjusted R² (64.7%) values are quite high, which reflects that nearly all of the variations in the dependent variable (agricultural export) are being explained by the estimation model.

Conclusion

The main objective of the study can be looked at from the theoretical and practical perspectives thereby predicated on the researcher's strong will to contribute to the body of knowledge by analyzing the economic impact of government spending on agriculture, unemployment rate, and crude oil price in the context of agriculture sector of non-oil for economic growth. Moreover, with the aims to bridge the literature gap in the knowledge of macroeconomic factors on the agriculture in Thailand ; since the non-oil export has the potential of growth in terms of sales, profitability, rate of earnings and productivity if the factors militating against the non-oil exports are addressed. Likewise, Sindhu et al. (2018) concluded that stabilization economic policies that will boost export promotion and productivity should be sustained and implemented; in wise of government policies stimulating agricultural productivity being examined. This will be of important for policy making in developing countries of the world especially Thailand for the design of macroeconomic policies in order to promote export through the aid of the agriculture sector; whereas leading towards improvement in economic growth. Likewise, since the role of agriculture in transforming the economy cannot be overstressed by serving as the source of food for human and animal and provides raw materials for industrial sector. Evidences by most economists based on the 1970s and 1980s experiences assumed that good macroeconomic policies are essential and adequate for the achievement of sustainable growth in the long run. Hence, macroeconomic factors which consists of fiscal, monetary and trade policies influence economic growth. Since all the policies (fiscal, trade and monetary) are interdependent, macroeconomic policies can therefore be defined as policy mix. Thailand as an example of a developing nations has embraced various policy mix in the means of improving the overall feasibility of the country's economy performance. Although several policies are being designed by the government to improve Thailand's economy as a whole, some policies often have causal and detrimental effects on output growth. For instance, the falling of global commodity price and increasing of world crude prices of recent have become more challenging for government in stimulating the economy without endangering macroeconomic stability (Gilpin, 2018). Hence, associate the improvement of macroeconomic factors to be anchored to the nations' growth.

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Paitoon CHETTHAMRONGCHAI is a lecturer of Department of Marketing, Kasetsart Business School, Thailand. He holds Ph.D. in Marketing Management from the University of Manchester, England. His areas of expertise are Marketing Management and Modern Management.

ORCID: <https://orcid.org/0000-0002-9744-4358>

Sudawan SOMJAI is an Assistant Professor and Director of the Doctor of Philosophy Program in Development Administration, Suan Sunandha Rajabhat University, Thailand. Her research areas are Public and Private Administration, Development Administration, Leadership and Social Sciences Research and have many articles in these areas.

ORCID: <https://orcid.org/0000-0002-8294-8166>

Thitinan CHANKOSON is an Assistant Professor of Business Administration at the Faculty of Business Administration for Society, Srinakharinwirot University, Thailand. He holds a Doctor of Science in International Service Business Management from North Eastern University, Thailand. His research interests are service business management, aviation management, international business management, supply chain management, and tourism and hospitality industry.

ORCID: <https://orcid.org/0000-0003-1855-678X>



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MATURITY OF RISK MANAGEMENT CULTURE

Beata Domańska-Szaruga

*Siedlce University of Natural Sciences and Humanities, Faculty of Social Science,
2 Konarskiego, 08-110 Siedlce, Poland*

E-mail: beata.domanska-szaruga@uph.edu.pl

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Abstract: Risk management culture is an element of management philosophy in an organization. Private, public and non-profit organisations differ in the objectives pursued while doing their business, but the activity of each of them entails taking and mitigating risks. To maximise the likelihood of reaching the objectives of an organization is essentially the sense of management. Yet, risk can create a threat that the objectives will not be met; therefore, to manage an organisation is to manage risk in such a way as to maximise the likelihood of achieving objectives. In this way, organisations build risk management culture, and, within it, they build such a system where the risk management process will be effective in maximising objectives. The article addresses the problem of building and improving risk management culture. It is part of broader research into the culture of risk management in companies and public organisations in Poland. The research, a basis for analysis and assessment of the maturity of risk management culture, was carried out involving survey questionnaires, free interviews and participant observations. To analyse the results and to assess the maturity of risk management culture in the surveyed organisations a categorization method and the author's risk management culture maturity model were applied.

Keywords: organization management; risk management; risk culture; risk management culture; maturity of risk management culture; method of categorization

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1. Introduction

Risk management is currently gaining in importance. An analysis of the potential impact of risk should result in actions and use of methods to properly manage it, taking preventive measures against risk materialisation at the level of causes. Risk management is a decision-making process with an implementation of actions aimed at increasing the likelihood of achieving the objectives pursued to ensure that the organization can continue to function. Risk management in the strictest sense is organizational work, involving job assignments, leadership, but also motivation, identification and estimation of employees, with monitoring, improvement and control of the activities undertaken. This all is a procedure designed to shape structures, functions and processes so that the organisation can respond effectively to emerging risks, accurately identifying threats, effectively eliminating them and noticing emerging opportunities. Generally, risk management of an organization comprises decision-making

and implementation of measures leading to risk acceptable level (Jajuga 2009). It is a process implemented by both the management and the employees, included in the strategy of actions and taking place in the whole organization.

Effective risk management is based on building strong risk management culture in the organisation. Building this culture means creating the basis for conscious risk management based on three basic pillars: organisational culture, awareness and involvement of employees and a well-developed risk management system. It means constructing both behavioural patterns, risk management infrastructures and mechanisms to manage risk effectively.

The article aims to discuss risk management culture and the author's proposal to evaluate this culture in an organisation. In order to achieve this, the maturity of risk management culture was studied, based on a literature query and empirical research. This paper is not a simple compilation of views contained in the literature, but to a large extent presents the author's own reflections, modelling the issues of construction and improvement of an organization's risk management culture. The author's model of the construction and improvement of risk management culture is based on three main dimensions of its maturity: organizational culture, awareness and involvement of employees and a developed risk management system. These dimensions were analysed and evaluated in the research, the essence of which was to determine the maturity level of risk management culture in the organisations surveyed, i.e. offices of local government units in Poland. Risk management is not only the domain of commercial enterprises, but this concept is successfully applied in other sectors. Moreover, public finance institutions, including local government units, are obliged by law to manage risk. The reasons for this state of affairs should be sought in the increasing managerization of public sector entities; it is a departure from 'ideal bureaucracy' to the model of efficient management of public funds (Młodzik 2012). Not only does risk management support those processes, but it is also a precondition for the effectiveness of public sector management. There are therefore more and more models and guidelines to help entities from different industries implement a risk management system. The presented reflections and analyses are part of broader research into the culture of risk management, and they are an effect of the author's participation in the processes of building management systems in public organisations.

2. Risk management culture: theoretical aspects and literature review

Risk culture is a problem that is not often undertaken in the literature. In particular it is absent in non-serial publications. Similarly, in risk management standards there are no behavioural elements or an emphasis on the role of culture in the risk management process. Writing about the success and effectiveness of risk management the authors, in addition to building the right risk management architecture, usually pay attention to the duties of managers and risk owners and the role of the managerial staff and their support for the idea of risk management (Jastrzębska, Janowicz-Lomott, Łyskawa 2014, Kumpiałowska 2011). Rather than describing employee participation in the risk management process (Malinowska 2011), the authors only mention this problem and do not normally deal with the topic of building risk culture in an organisation. Many authors discuss risks and errors in the risk management process by paying attention to the communication between the risk manager and the management and business environment, describing the way messages are formulated (Lorek 2011, Taleb 2013), or analysing an improper selection of tools for risk management. Those shortcomings and errors are simply brought about by a lack of proper risk management culture. The European Commission also points that out (European Commission 2010), listing the absence of risk culture in organisations as one of the main causes of the collapse of many financial institutions.

The issue of risk management culture is mainly present in short monographs, in some, not many, scientific papers, in reports of organisations active in the dissemination of risk management issues, or in specialised training

materials. There is a stronger perception of risk management culture abroad than in Poland. More attention to risk management culture is devoted by financial institutions, who often identify it with risk culture (Committee of European Banking 2010) (in fact, there is a fine line between the notion of risk culture and the culture of risk management, and in the literature the term is used interchangeably). Generally it is done in the form of recommendations rather than obligatory regulations.

Risk culture is a concept that is difficult to define, interpret and investigate, if only because it consists of two highly-complex multidimensional categories, namely culture and risk. In addition, culture and risk are part of different scientific disciplines (economic sciences deal with risk, and culture finds an important place in sociology, psychology and anthropology) that are characterized by other methods of research. In examining the definitions of risk culture in the literature S. Kasiewicz and L. Kurkliński (2016) distinguished the following approaches:

- a) culture plus: relying on the definition of culture, 'risk' is emphasized as a term used as a detailed area of interest to refer to culture (Banks 2012). Thus, risk is essentially part of culture. An alternative suggestion can be immediately made to change these roles, i.e. to take the definition of risk as a basis and to treat culture as a supplement;
- b) attribute: emphasizing the characteristics of risk culture (strong, weak, clear, good, etc.) (Ludwig 2015), referring, among others, to the dimensions of culture, above all, to avoid uncertainty (Hofstede, Hofstede 2007);
- c) instrumental: resulting from the perception of risk culture by financial institutions and its operationalization in the form of implemented programs (Power, Ashby, Palermo 2012);
- d) narrow view: risk culture includes the perception of 'risk appetite' in the organization (Boizeman, Kingsley 1998).

Despite many common features, differences between the concept of risk culture and the concept of risk management culture can be pointed out. The notion of risk culture is a much broader term, although it does not have one generally accepted definition. Risk culture should be understood as an awareness of the need for risk management at each level of an organisation, and it should constitute a set of values, attitudes and risk behaviour patterns represented by a person or group of people (Committee of European Banking 2010, Hopkin 2010). An organisation's risk culture describes the degree to which its culture encourages or limits the taking of risks and the opportunities that arise from those risks (McGing, Brown 2014).

The culture of risk lies at the heart of human decisions and everyday activities of each organization. This is a key concept for building risk management culture and the basis for effective risk management in organizations. The culture of risk existing within an organization has a significant impact on the organization's ability to manage risk, and a lack of risk culture makes it difficult to achieve strategic, tactical and operational goals. The culture of risk management is connected with the architecture of the risk management system, organization of the risk management process and with clear specification of the tasks of individual participants of this process. It is based on risk culture and without risk culture it is difficult to achieve. It requires a full understanding of the risk to which the institution is exposed and the way it is managed. It is risk culture and especially the attitudes of organization members that determine the system architecture, organization of the risk management process and the way of managing particular types of risk, taking into account the level of risk tolerance and the adopted risk appetite (Domańska-Szaruga 2016).

Bearing in mind that correct and consistent culture of risk management is a key element of effective risk management, the organization should shape risk management culture through appropriate regulations and procedures specifying, among others, desirable attitudes in this regard, appropriate examples, motivational systems not only of financial nature as well as methods of communication and training of employees in the scope of their responsibilities related to risk. To summarise the above paragraphs, it is possible to point out the fundamental difference between risk culture and risk management culture (Table 1).

Risk culture	Risk management culture
<ul style="list-style-type: none"> • a set of values, attitudes, and patterns of behaviours towards risk which a given person or a group of people represent, • behavioural standards and traditions of individuals and groups in an organization, which determine the way in which they understand and take actions related to risk, • a term which denotes values, convictions, knowledge of and approaches to risk shared by a group of people with a common intended purpose, in particular the employees of an organization 	<ul style="list-style-type: none"> • based on risk culture, a complete understanding of risk and the way risk is managed, • one of the key elements of effective risk management, • related to the architecture of the system of risk management, developed at the organizational level and can and should be constructed with the use and application of guidelines and recommendations. • development of risk management culture entails a construction of mechanisms thanks to which risk management will take effect via conscious engagement in the risk management proces of employees at various hierarchy levels

Table 1. Risk culture and risk management culture

Source: own elaboration

Risk management culture combines all elements of risk management infrastructure and reflects common values, goals, practices and mechanisms that involve both risk in the organization's decision-making processes as well as risk management in operational processes. The culture is shaped at the organizational level and can and should be built using guidelines and recommendations. It can be defined as the culture of conscious risk management, which involves full awareness of risk management at all levels of the organization's management and its activity (Domańska-Szaruga 2016). The management of the organization openly communicates hazards, defines risk category, sets directions, engages employees in the risk management process and rewards appropriate behaviour.

Risk culture is a concept that reflects personal beliefs and values of organization members, their individual predispositions and attitudes towards risk and ethical values. The relationship between risk culture and organizational culture is clearly visible. Organizational culture is usually defined as social norms and systems stimulating employee values, the right organizational climate, management methods, shared meanings and symbols, cognitive schemas, behavioural requirements and the system of thinking patterns and activities embedded in the social environment of the organization (Sikorski 2012).

As already mentioned, the boundary between the concept of risk culture and risk management culture is very blurred. These terms are basically used interchangeably. What can be encountered under the term of 'risk culture' is a definition of risk management culture, and there is a joint treatment of these two concepts. However, according to some authors it is necessary to distinguish between these concepts and to use the concept of risk management culture to determine the construction of a risk management system based on mechanisms that determine the effectiveness of this system thanks to full awareness of risk management at all levels of the organization. In reality, however, the notion of risk culture dominates in the literature and is very often used to determine the construction and functioning of mechanisms that ensure effective implementation of the risk management process in an organization.

Table 2 shows selected definitions of risk culture. These definitions are as ambiguous as the definitions of organisational culture. Hence, the attempt to define risk management culture more narrowly as opposed to risk culture in an organization.

Table 2. Selected definitions of risk culture.

Definition	Author
Risk culture is a set of values, attitudes and patterns of behaviour towards risk, represented by a given person or group of people	Hopkin (2010)
Risk culture is not a static thing but a continuous process, or processes, which repeats and renews itself, but may be subject to shocks. Risk culture will be a mixture of formal and informal processes. The former are easy to observe. The latter are harder to observe since they involve a myriad of small behaviours and habits which in the aggregate constitute the state of risk culture at any one point in time.	Power, Ashby, Palermo (2012)
Risk culture are the norms and traditions of individuals or groups within the organization that determine how they identify, understand, discuss and undertake activities related to the types of risk an organization faces and which it undertakes	Institute of International Finance (2009)
Risk culture is the awareness of the need to manage risk at every level of the organization, it is the basis for effective risk management	Committee of European Banking Supervisors (2010)
The extent to which the board (and its relevant committees), management, staff and relevant regulators understand and embrace the risk management systems and processes of the organisation.	The Institute of Risk Management (2012)
Risk culture is a system of values and norms of conduct that shape employee decisions and actions. Determines the collective ability ... to: recognize, understand, openly discuss and undertake current and future threats to the organization; act consistently as part of the risk appetite; and ultimately achieve the strategic goals and goals of the organization.	Australian Prudential Regulation Authority (2016)

Source: own elaboration

Risk culture can be understood as an effect of organizational culture on risk management. The often quoted definition of organizational culture is "a system of common values (which define what is important) and standards defining appropriate attitudes and behaviour of members of the organization (how they should feel and behave)" (O'Reilly, Chatman 1996). Risk culture is an application of this concept to the way the organisation acknowledges and manages risks. Risk culture is therefore not separated from organisational culture. Standards and traditions relating to risk culture arise as a result of common experience within the organisation over time. Moreover, all organisations have the culture of risk regardless of whether they are aware of the risk and are aware how to manage it .

Risk management culture should be developed in the organisation by strong risk management leadership, by the involvement of authorities and all the staff in the risk management process, emphasis on training in this field, identification of employees responsible for specific risk management tasks and by developing openness and communication. The author's proposal for a pyramid of risk management culture (Figure 1) can be used as an example and very general presentation of the components of risk management culture. The foundations of risk management culture presented this way are organisational culture, employee involvement and risk management system.



Figure 1. The pyramid of risk management culture

Source: own elaboration

Without creating and supporting involvement of the managerial staff, risk management culture does not have a greater chance of survival, becoming merely a blind record in risk management policy. The management should communicate with employees, providing them with guidance on the culture of risk management and imposing obligations. Instead using the phrase ‘risk management culture’ some authors use the concept of ‘risk awareness’, as the effectiveness of risk management activities depends primarily on those who pursue this process.

The risk management system is another key variable that determines the success in risk management. Building a risk management system is an integral part of risk management culture because strong risk management culture is built into the process of creating a risk management system using frameworks and guidelines, which also entails responsibilities of individual participants in the risk management process and in the organisation of the process.

Another element of the foundations of risk management culture is organisational culture focused on risk awareness. This often involves changing organisational culture into the culture of security and risk management. An important component of risk management culture is risk tolerance/risk appetite. The setting down of risk appetite and risk thresholds is the basis for the effectiveness of risk management. Risk appetite holds a key place in the risk management architecture. A clear statement regarding risk appetite and the level of tolerated risk together with continuous monitoring of these parameters reveals the level of risk management maturity.

In summary, risk management culture is the philosophy of managing the organization. Organisations have different objectives but each of them has to take risk and mitigate it.

Management is based on maximising the likelihood of reaching the objectives, but the presence of risk means that they might not be met. Therefore, the management of the organisation manages risk in such a way as to maximise the likelihood of achieving the objectives. In this way, organisations build risk management culture, and, within it, a system and process of risk management that will be effective in meeting the objectives.

3. Building and improving risk management culture

Risk management culture fosters effective risk management and judicious risk-taking. Building risk management culture means building a risk management architecture based on the principles of ethics, accountability, communication and fairness. It is the appropriate organization and construction of mechanisms that will make risk management effective due to the involvement of employees at all levels.

The basis for creating these mechanisms is the built-in risk management architecture and implementation of the risk management system. However, at this stage it is necessary to consider the construction of such risk management culture that would make the system effective.

Effective risk management enables, among other things, more effective provision of services, better use of resources, more efficient implementation of organizational and financial innovations, and it also supports the creation of the organization's values. In addition, an organisation that has built risk management culture may decide to modify it. In this case, it is necessary to design changes to improve it.

Figure 2 shows the author's model of building and improving risk management culture. The model is based on a methodology which takes into account both systemic and behavioural factors.

This model (and precisely those identified mechanisms that build risk management culture in public organisations) has been used to build a tool to diagnose the maturity of the public organisation's risk management culture, as presented later in the article.

The proposed actions, on which the construction of risk management culture was based, were included in three groups (dimensions).

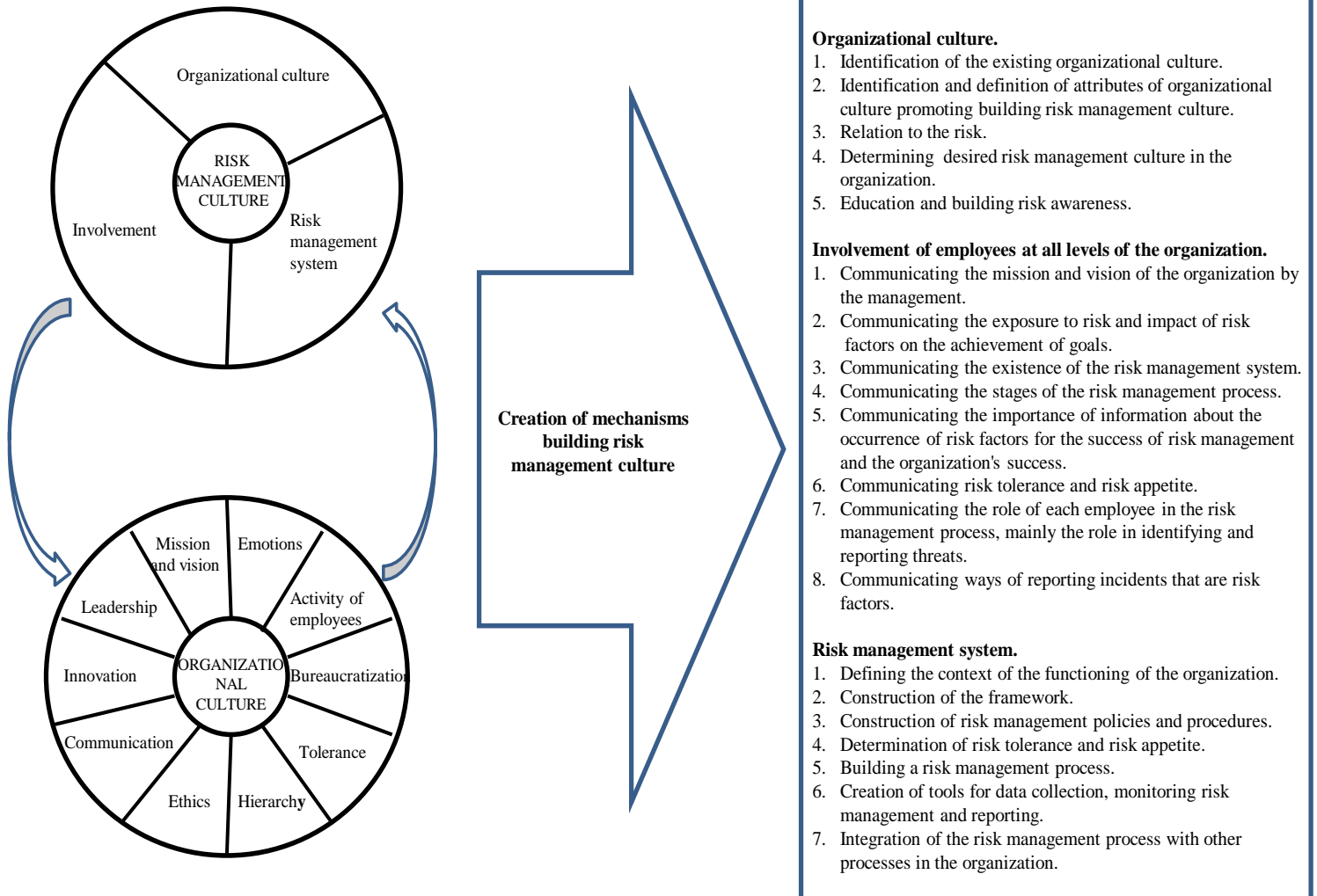


Figure 2. Model of building and improving risk management culture

Source: own elaboration

The use of a model to build or improve risk management culture must be based on successive stages. In Figure 3, these stages are included in the form of the so-called 'circle of risk management culture' based on the assumption of continuous improvement and, therefore, the repeatability of the cycle.

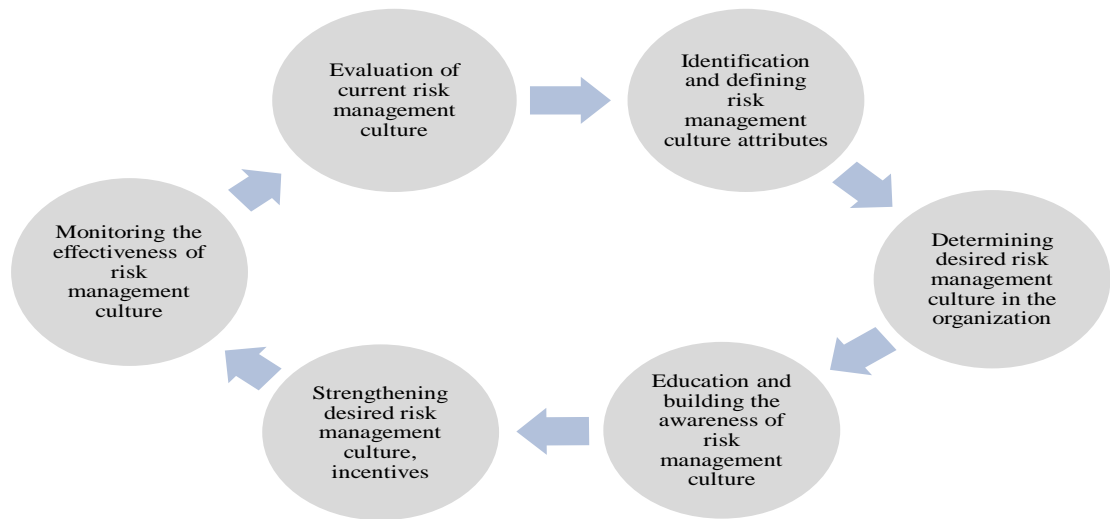


Figure 3. Circle of risk management culture

Source: own elaboration

The author's model presented above is one of the approaches to building and improving the culture of risk management.

In the risk management literature it is difficult to find similar models and guidelines. Instead, it is important to reach out to the studies of companies providing consultancy and audit services, e.g. Institute of Risk Management. However, their solutions are dedicated to businesses, and their use in other types of organizations may be rather fragmented.

4. The author's concept of the maturity model of risk management culture

Striving to improve the culture of risk management, the management of an organization needs a certain point of reference in order to be able to determine the level of advancement of this process. Therefore, it needs a model that will allow comparing the results of risk management culture assessment with the point of reference, which will allow determining the level of maturity of this culture.

The determination of the level of maturity is the basis for the development of a program of changes - detailed actions allowing the achievement of the desired level of maturity of risk management culture. One of the existing models of process maturity can be adapted for this purpose, for example the following maturity model of the risk management process (Figure 4).

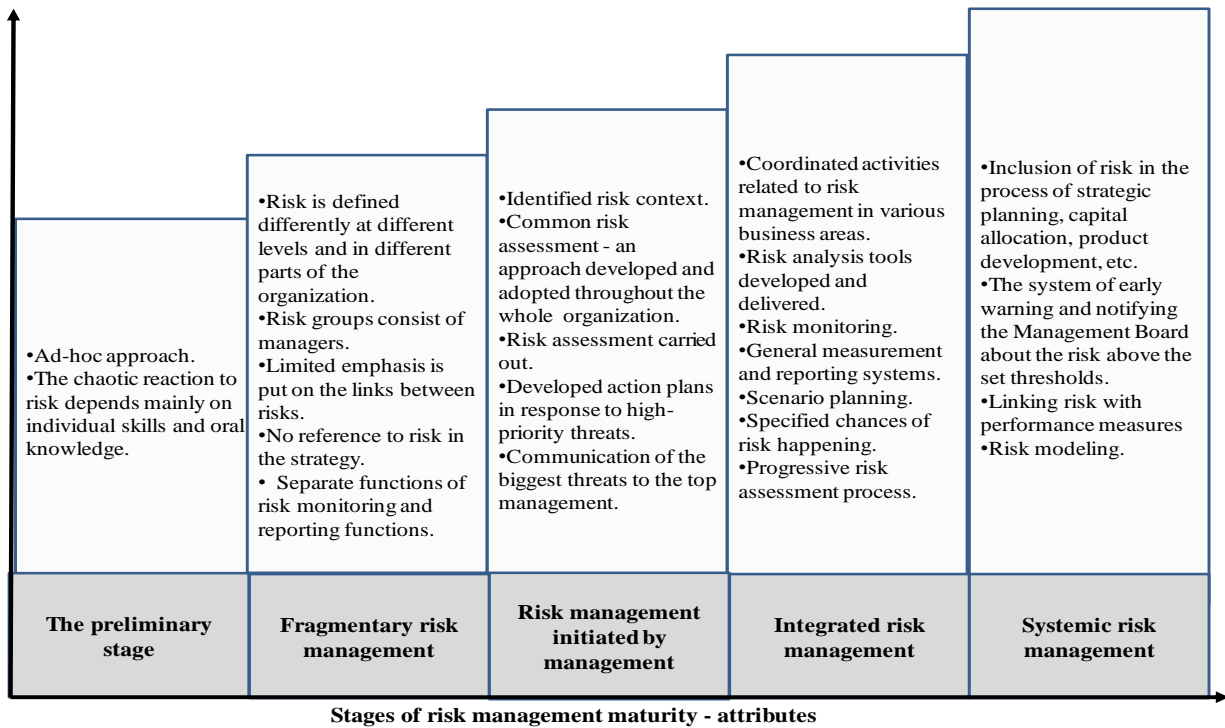


Figure 4. Maturity model of the risk management process.

Source: own elaboration based on: (Deloitte Development LLC 2006, Deloitte LLP 2015)

However, adaptation of the process maturity model is not an optimal method for measuring and assessing the maturity of risk management culture.

A better solution is to develop a model that would be based on the maturity model of risk management, at the same time taking into account not only the maturity of the process, but also evaluating all the components of risk management culture.

Inspired by process maturity models and taking into account the components of management culture, the concept of a maturity model of risk management culture consisting of four levels can be proposed. The assumption of the model is the suitability for assessing the maturity of risk management culture in the offices of local government units (Figure 5).

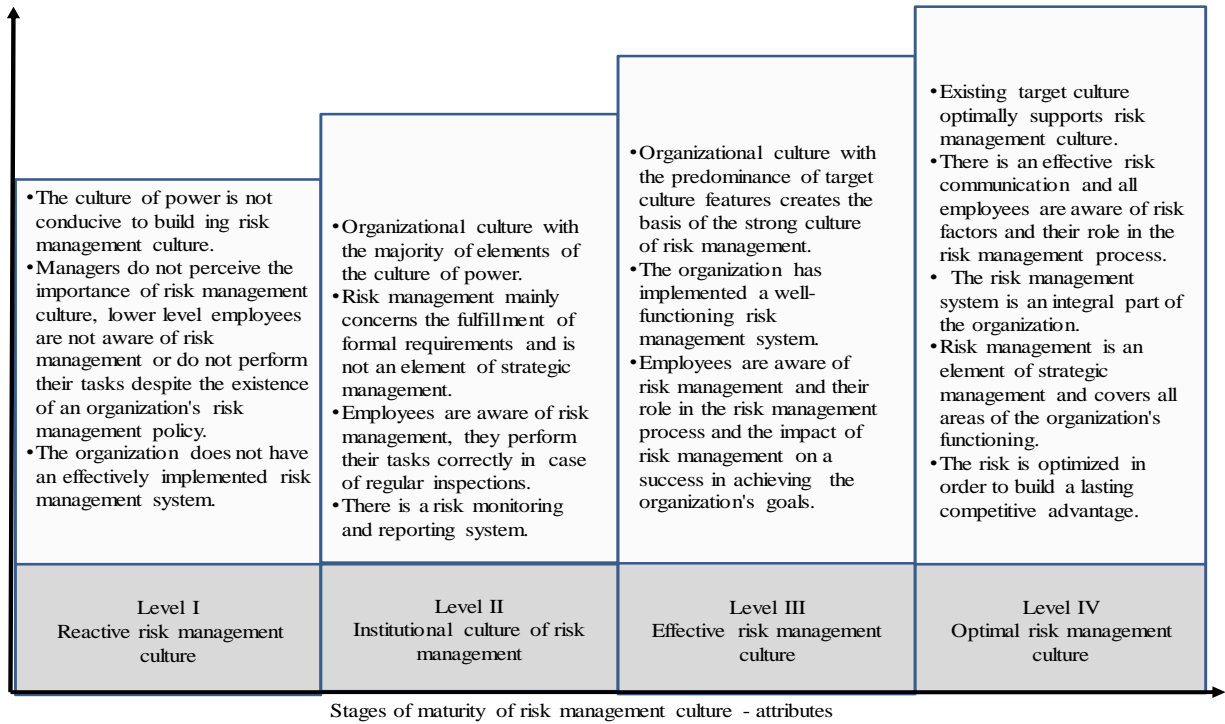


Figure 5. An original maturity model of risk management culture

The model presented above is universal and can be successfully used to assess the maturity level of risk management culture in various types of organisations, including commercial enterprises.

5. Maturity of risk management culture in the offices of local government units in Poland - empirical research methodology

Currently, the literature increasingly deals with maturity of management systems, including maturity of risk management. However, it is lacking in comprehensive and reliable research on this subject. In addition, limited as they are, research attempts are usually flawed by methodological errors. They are based on a self-assessment conducted by organisations which in results are classified into maturity levels on the basis of subjective evaluation. Additionally, although there is a growing recognition of risk culture, in principle not much literature on risk management culture is available, which clearly results in a lack of adequate research.

The study of risk management culture maturity at the offices of local government units in Poland was conducted between 2016 and 2019. That was a multi-faceted study of organisational culture, maturity of the risk management process and the maturity of the organisation's risk management culture.

A key issue in the assessment of the maturity level of risk management culture is the choice of a research procedure to carry it out. A simple survey with questions used to classify an organization into a maturity level is inadequate. Classification on the basis of an assessment of each of the actions needed to build and improve risk management culture listed in the model presented in Figure 2, with equal treatment of their weights, is also not a good methodology. An additional problem is the divergence of assessments of individual criteria used to classify an organisation into a particular level

In view of the above doubts about reliability of research for the purposes of assessing the maturity of risk management culture, a categorization method was applied to the offices of local government units. Categorization is a research procedure, the essence of which is to assess the condition or functioning of the object for its qualitative classification (Cabała P, Messiah C, Piekarz H, Stabryła A, Wozniak, 2009). A category is a qualitative class of an object, determined on the basis of a value scale. Categorisation may be aimed at the comprehensive or partial classification of the organisation's activities. It can be successfully used to assess the organisation in terms of risk management culture maturity.

The studies were conducted in 74 selected municipalities. In the first phase of the research, the selection of evaluation criteria was carried out. A comprehensive assessment of risk management culture maturity requires that the structure of the evaluation criteria should be diverse, but it should also be complementary. These are very important issues in terms of the completeness and accuracy of the diagnostic analysis. In the investigation, the structure with 20 evaluation criteria proposed in the author's model of building and improving risk management culture was adopted.

It should be stressed that the selection of criteria used in the author's model of building and improving risk management culture was made by an expert method based on a qualitative assessment of facts, intuition and, above all, on individual association pattern, as a type of algorithm to understand the existing state and to make predictions. Overall 20 experts were selected, including six professors in the field of management and in other disciplines of social sciences, 10 municipality employees in managerial positions and four business consultants. E-mail was used as a means of communication with them. For each of the selected criteria, its characteristics and evaluation model optimal for building and improving risk management culture were specified (Table 3). The achievement of the ideal conditions was marked by ascribing the maximum number of points according to the conversion of evaluation criteria shown in Table 4.

Table 3. Characteristics and evaluation models of 'Identification of the existing organizational culture' criterion

K1 Identification of the existing organizational culture
<p>Criterion characteristics</p> <p>The criterion is used to evaluate organisational culture in municipalities. Organizational culture is a style of the organization, views and values shared by its members, common behavioural patterns and ways of communicating. The culture of the organization is a cornerstone of risk management culture, as it directly affects the organization-specific risk management architecture and risk management principles. Appropriate organisational culture facilitates organisation of the risk management process, particularly in the area of responsibility of the organisation's members for risk management.</p> <p>Evaluation models</p> <p>The model status, i.e. organisational culture that is optimal for the construction and improvement of risk management culture, is achieved when:</p> <ul style="list-style-type: none"> -mission and vision are constantly communicated and known to employees, - there is a code of ethics in the organization, and ethical behaviour is rewarded, -leadership style in the organization is identified with innovation, efficient organization and coordination, -decentralization of decisions in the organization is introduced wherever possible, employees have a sense of equal rights, - autonomy, initiative, innovation, freedom and originality are preferred in the organization; -written communication takes place where it is necessary; whereas oral communication is of great importance, particularly when there is a need for swift action, -the degree of formalization is appropriate to the public institution; the initiative undertaken by employees is appreciated, -there is an opportunity for discussion, argumentation and exchange of views in the organisation; there is openness, freedom and immediate communication between the members of the organisation; differences in status and hierarchy do not inhibit access to information, -among employees there is an acceptance to expose irregularities, and the appropriate behaviour in the field of information about events is noticed and rewarded, -employees have a sense of being appreciated and show a high degree of loyalty to the workplace.

Source: own elaboration

The table presents a description of one of the 20 criteria used in the research. In fact, similar descriptions had been drawn up for all criteria. They were the basis for constructing a questionnaire for a research survey addressed to municipal offices. The questionnaire included 82 research questions divided into 20 groups, i.e. 20 research criteria. The CATI method was used to carry out the survey. CATI (computer-assisted telephone interviewing) is a computer-aided phone interview. When obtaining information, an appropriate computer script is used to automate the work. The data collected were analysed by means of categorization. In view of the fact that there were many questions in the research survey, the results were presented synthetically.

The results of the studies were compared with the designed optimal evaluation model, containing so-called preferential aspects, awarding points on a scale from 0 to 6 according to the previously constructed table of conversion (Fig 4).

Table 4. Table of conversion of evaluation criteria of risk management culture.

Evaluation criteria assessment	Insufficient	Sufficient	Satisfactory	Average	Good	Very good	Excellent
Points	0	1	2	3	4	5	6

Source: own elaboration, 2017

Taking into account the impact of different criteria on the maturity level of the risk management system (the impact was determined with the expert method), the weights from 1 to 3 were awarded to each criterion (Table 5).

Table 5. The weights of evaluation criteria

Criterion	Weight
K1 Identification of the existing organizational culture.	3
K2 Identification and definition of attributes of organizational culture conducive to building risk management culture.	2
K3 Attitude to risk.	1
K4 Determining desired risk management culture in the organization.	2
K5 Education and building risk awareness	2
K6 Communicating the mission and vision of the organization by the management.	1
K7 Communicating exposure to risk and the impact of risk factors on the achievement of objectives.	1
K8 Communicating the existence of a risk management system,	1
K 9 Communicating the stages of the risk management process,	1
K 10 Communicating the importance of information on the occurrence of risk factors for the success of risk management and organizational success.	1
K11 Communicating risk tolerance and risk appetite.	1
K12 Communicating the role of each employee in the risk management process, mainly the role in identifying and reporting threats.	2
K13 Communicating how to report incidents that are risk factors.	2
K14 Defining the context of the organization's functioning.	1
K15 Construction of the framework.	3
K16 Construction of risk management policies and procedures.	2
K17 Determination of risk tolerance and risk appetite.	2
K18 Construction of the risk management process.	3
K19 Creation of tools for data collection, monitoring risk management and reporting.	2
K20 Integration of the risk management process with other processes in the organization.	2

Source: own elaboration

Taking into account the evaluation criteria presented above, the maturity index of risk management culture (MIRMC) can be determined as follows:

$$MIRMC_i = \sum_{j=1}^n w_j * q_{ij}$$

where:

w_j – weight of the j -th criterion of assessment,

q_{ij} – a point-based verifying evaluation related to the i -municipal office,

$i = 1, \dots, m$ – municipal offices,

$j = 1, \dots, n$ – evaluation criteria.

6. Results and discussion

The MIRMC index proposed above was established for each of the municipalities surveyed. Its maximum value was 210. After the determination of the maturity index value of risk management culture for each municipality office, a qualification procedure was developed. It was a formalised way to include the rules and conditions for determining the category of the municipality by virtue of its maturity level of risk management culture. The qualification procedure specified the value scale and the hierarchical intervals of the MIRMC index (the last interval had the smallest span). The hierarchical intervals were matched with the levels of risk management culture maturity (Table 6, Figure 6).

Table 6. Hierarchical intervals of the MIRMC index.

Maturity level	Score (Value of the MIRMC index)	Number of municipal offices
Level I - Reactive risk management culture	0 - 80	9
Level II - Institutional culture of risk management	81 - 130	25
Level III - Effective risk management culture	131 - 180	29
Level IV - Optimal risk management culture	181 - 210	11

Source: own elaboration

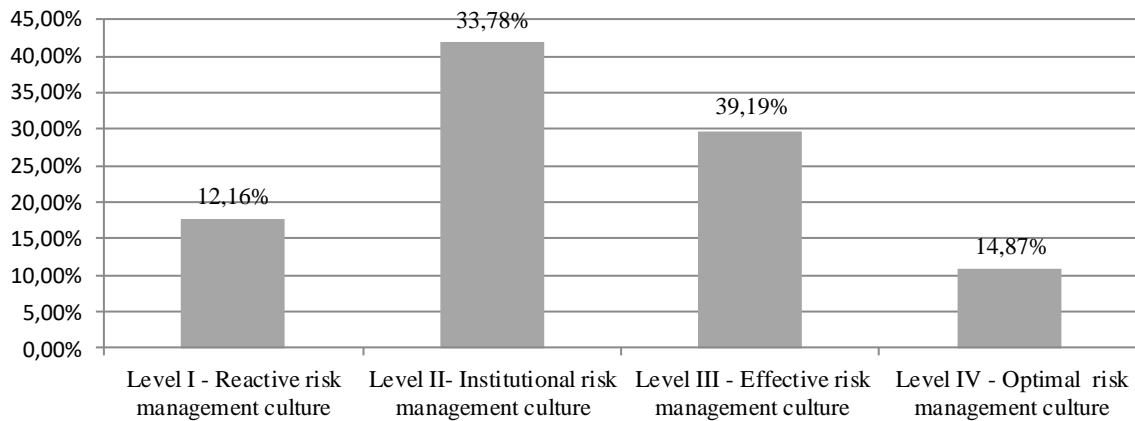


Figure 6. Distribution of municipal offices in terms of the level of maturity of risk management culture.

Source: own elaboration

The presented research results indicate the dominance of institutional culture of risk management in municipal offices in Poland. This level is characterized by the management's attitude to meeting formal requirements in the scope of risk management, which are imposed by law. In Poland, the Act of 27 August 2009 on public finances imposes on managers of units of the public finance sector, including local self-government, the obligation to provide management control in managed units and within its framework to provide control of risk management. Unfortunately, many of these units today treat risk management as a formal requirement but not an element of effective management. It is true that employees perform their duties in the risk management process, but they are motivated by regular controls.

The analysis of the maturity dimensions of risk management culture allows for the study of individual assessment criteria and the selection of the criteria that have been assessed the lowest based on the results of surveys and structured interviews. On this basis, it is possible to formulate recommendations for the management of municipalities to improve risk management culture. The worst results in municipalities were reported for criteria:

K2- Identification and definition of attributes of organizational culture conducive to building risk management culture,

K4- Determining desired risk management culture in the organization,

K11- Communicating risk tolerance and risk appetite,

K20- Integration of the risk management process with other processes in the organization. The results of these criteria are shown in Figure 7, Figure 8, Figure 9, Figure 10.

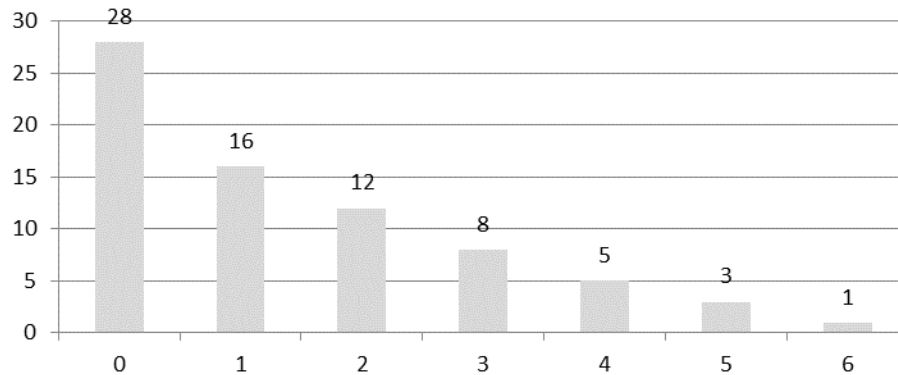


Figure 7. Score distribution for criterion K2- Identification and definition of attributes of organizational culture conducive to building risk management culture (N = 74)
Source: own elaboration, 2018

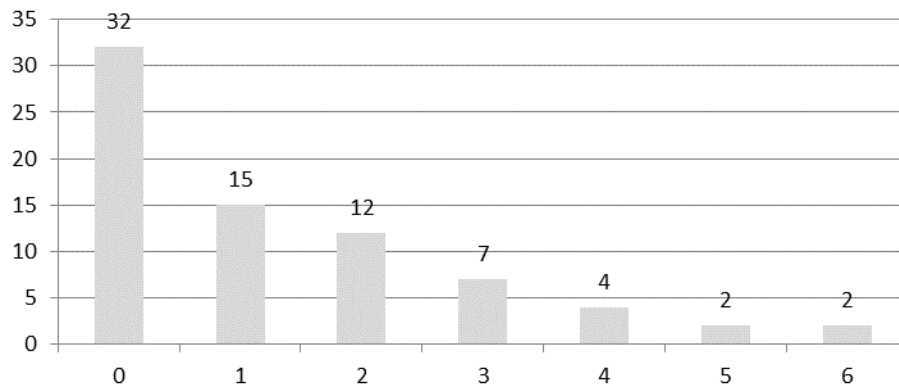


Figure 8. Score distribution for criterion K4- Determining desired risk management culture in the organization (N = 74)
Source: own elaboration, 2017

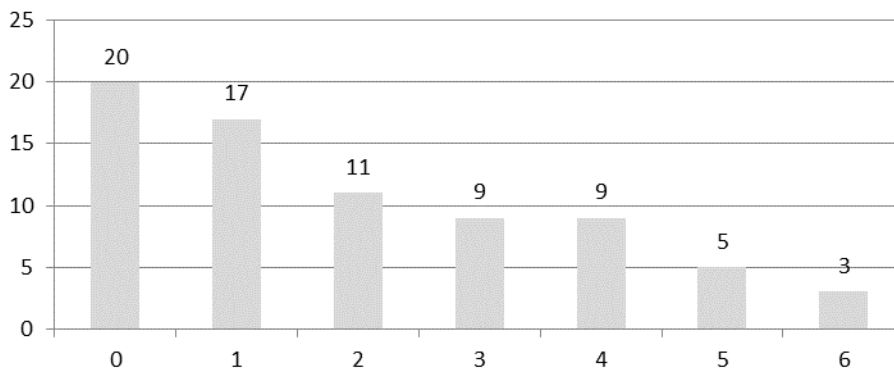


Figure 9. Score distribution for criterion K11- Communicating risk tolerance and risk appetite (N = 74)
Source: own elaboration, 2018

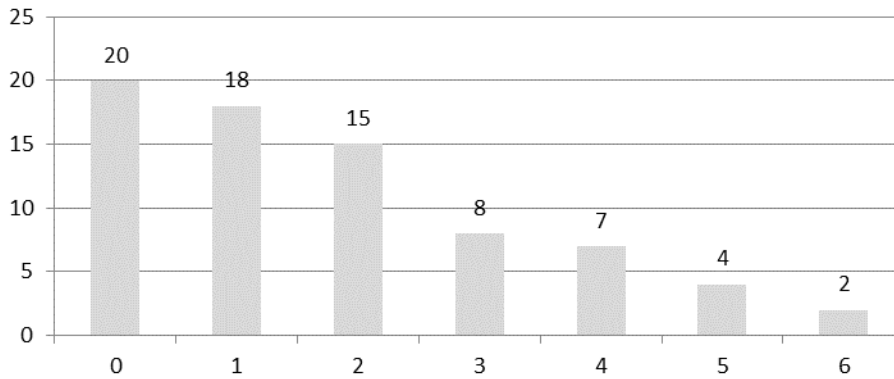


Figure 10. Score distribution for criterion K20 – Integration of the risk management process with other processes in the organization (N = 74)

Source: own elaboration, 2018

In Poland the Ministry of Finance annually receives reports from public organizations, based on self-assessment of management control, including risk management control. The methodology adopted is fairly straightforward and involves completing a questionnaire, but it is very likely to be to a large extent subjective, with some assessment errors.

The research presented in the present paper is the only comprehensive study of risk management maturity in the offices of local government units in Poland. It may be regarded as certain that despite the increasing number of publications devoted to process maturity, the authors rarely take an effort to investigate the level of maturity. Such studies, apart from advancing the researcher's interests, are important in the practice of managing organisations. So far there have been no patterns and guidelines indicating how organisations can assess the level of process maturity. The present research, carried out primarily for methodological reasons, could be a benchmark for the organisation's self-assessment and is therefore of great importance for the practice of managing organisations.

Conclusions

Legal regulations and dynamic changes in the approach to risk management enforce the inclusion of risk management in the strategy of local government units and the involvement of not only the management and risk managers, but even all organizational units and employees. It is mainly about achieving a specific state of process maturity defined as the ability of the organization and its processes to systematically provide a better quality of services. The author's own scientific work supported by the presentation of views contained in the subject literature allow an identification of a research gap in this area to draw conclusions about the use of process maturity models to assess the maturity of risk management culture.

The research has indicated an unsatisfactory state of risk management culture in municipal offices in Poland. It is to be hoped that the growing number of research and studies on this subject as well as the proposed solutions will be a factor inspiring changes and improvements that will allow for achieving higher levels of risk management culture maturity in public organizations.

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Beata DOMAŃSKA-SZARUGA, habilitated PhD is the Associate Professor at Siedlce University of Natural Sciences and Humanities, Poland. Research interests: risk management (in particular, public sector risk management), corporate governance, sustainable enterprise development and corporate social responsibility, economic safety, financial exclusion (mainly credit exclusion).

ORCID ID: orcid.org/0000-0001-7290-4197

Register for an ORCID ID:

<https://orcid.org/register>

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HOW THE NEXUS AMONG THE FREE TRADE, INSTITUTIONAL QUALITY AND ECONOMIC GROWTH AFFECT THE TRADE FROM ASEAN COUNTRIES

Paitoon Chetthamrongchai ¹, Kittisak Jermisittiparsert ², Sakapas Saengchai ^{3*}

¹ Faculty of Business Administration, Kasetsart University, Bangkok, Thailand

² Department for Management of Science and Technology Development, Ton Duc Thang University, Ho Chi Minh City, Vietnam

² Faculty of Social Sciences and Humanities, Ton Duc Thang University, Ho Chi Minh City, Vietnam

³ Faculty of Humanities and Social Science, Suan Sunandha Rajabhat University, Bangkok, Thailand

E-mails: ¹fbusptc@ku.ac.th; ²kittisak.jermisittiparsert@tdtu.edu.vn
^{3*}sakapas.sa@ssru.ac.th (Corresponding author)

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Abstract. The main purpose of the study is to answer the research question that How the nexus among the free trade, institutional quality and economic growth effect the trade from ASEAN countries. The exports become uncompetitive because of such hidden tax and high production costs in ASEAN. It can be said that importer/importers can achieve competitive advantage by being involve in corrupt activities as compared to others who are not willing to give bribes. The trade can be enhanced or hindered through corruption based on the willingness of firms in the exporting countries to offer bribes at a competitive level. Precisely, the focus of the discussion is on the channels through which global trade can be influenced. This shows that the main influence of corruption, which is an institutional quality on the global trade, is an issue to be empirically investigated. Considering this notion, the previous knowledge has been extended by including some other variables of institutional quality such as good governance, instability of governance and corruption by keeping the focus on flow of trade in ASEAN. Moreover, the data is allowed to decide whether the variables of institutional quality i.e. instability of government, corruption and good governance influence the trade across the border in a positive or negative way in the ASEAN countries. The findings of the study have provided support to the hypothesized results.

Keywords: ASEAN; Trade; Economic growth; Institutional quality

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1. Background

International economies have undergone a series of significant developments during the last few decades, including the formation and implementation of bilateral and regional trade agreements. A wave of trade liberalization is quickly reshaping the nature of cross border transactions. With the re-emergence of neo-liberal philosophy in the 1980s espousing the removal of all forms of trade restrictions, most developing countries did an abrupt U-turn in their major policy thrusts to embrace neo-liberal economic development orthodoxy. In the early

part of 1990s, the number of regional trade agreements increased and continued to grow. According to the World Trade Organization (WTO), regional trade agreements (RTAs) can be defined as reciprocal trade agreements among two or more partners and as of June 2014 about 585 notifications of Regional Trade Agreements (RTA) were received while 379 were in force (WTO, 2014).

This explosion of trade agreements was fuelled by several developments. The United States created the bilateral Free Trade Agreement (FTA) with Canada in 1987 and the North American Free Trade Agreement that included, Canada, Mexico and the United States in 1994, and the establishment of the European Union in 1993 helped fan the flames of free trade. The General Agreement on Tariffs and Trade, which began in 1948, morphed into the World Trade Organization in 1995, and the number of RTAs that announced their intentions to joint increased rapidly (WTO, 2014) showing a significant increase from the mere forty RTAs that existed in 1990 (Lu, 2017). As these trade agreements expanded, they created what has been called a “spaghetti bowl” of RTAs with the provisions of many RTAs cutting across each other (Murphy & McLarney, 2018). In general, five types of integration exist: Common Market (CM), Custom Union (CU), Free Trade Area (FTA), Preferential Trade Agreements (PTA), and an Economic and Monetary Union (EMU). The desire to achieve economic growth across the continent has prompted many Asian countries to create regional cooperation. See Figure 1.

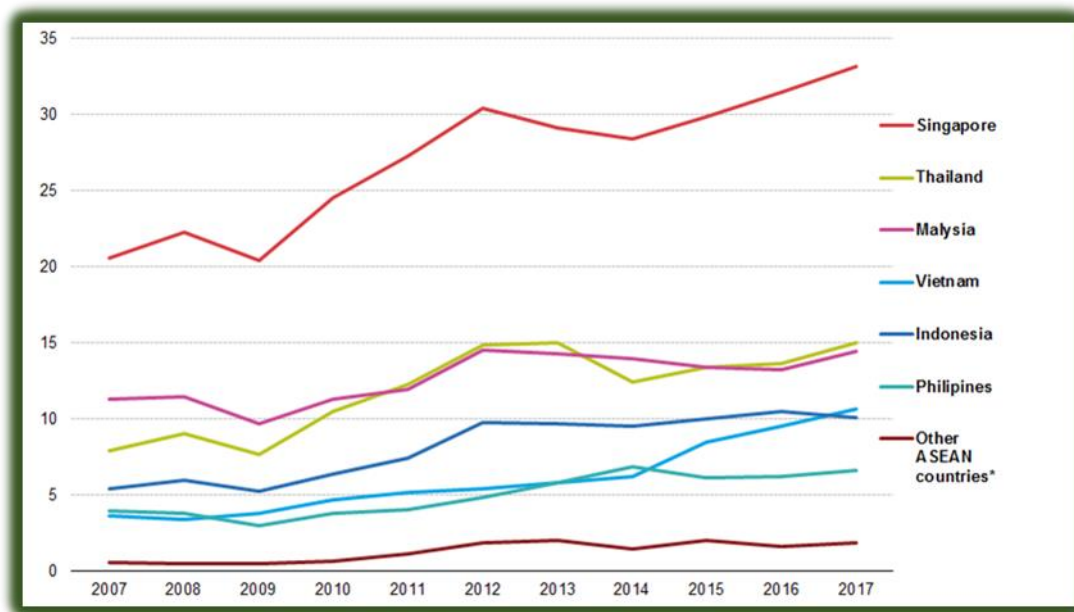


Figure 1. Export of ASEAN countries

Source World Bank

In literature, the area of trade nexus and institutional quality reflects that corruption is a variable of institutional quality, which hinders global trade. There might be a possibility that corruption is affected through global trade, but the relation runs from trade to corruption casually. The flow of trade can become low because of trade barriers, which promotes black market and increase in corruption. The traditional research studies on corruption have elaborated three different ways such as the channel of efficiency, the price mark-up, and the awarding of contract. The economic progress is influenced through the change in efficiency by the corruption under the channel of efficiency. The growth and economic efficiency can be enhanced through the speed money when the pervasive and cumbersome regulations in the economy are exogenous. In a study, it was argued by researchers that the government employees consider bribes as a piece rate. It was also shown that individual bypass the delays

in bureaucratic because of bribes. This sort of corruption can result in growth of global trade. It was indicated by Kölbl (2015) that the welfare can be improved by corruption when the resource transferring enticements replace the queue up costs.

Inefficiency can also be resulted through corruption. It was indicated by Boianovsky (2019a) that the corrupt government officials can make delay in the administrative works for getting more bribes rather than enhancing the speed of procedure. It was discovered by Sartor and Beamish (2018) that when more bribes are paid by firms, this results in more time for management including negotiation of bureaucratic regulations. This can include higher capital cost. The trade can be reduced or improved under the cost channel transaction or price markup. However, this is based on the theft involvement (Hussain et al., 2019). It was argued by Della Porta (2017) that when theft is involved in corruption, this is referred as collusive corruption. Bribes can be levied by the government officials, which can be lower than the official rate of tax. The shipment arrived in an economy may have low cost of transaction this reduces the mark up price that enhances trade. The government becomes the loser and the exporters/importers taking bribe becomes the winner.

When theft is involved in corruption, extra charges are added by the agent in addition to the official duty. This refers to some hidden tax, which increases the transaction cost and lowers international trade. This channel was discussed by Thompson (2017) in their predation model. It was argued by the researchers that corrupt officials could attack the shipments. In this regard, the shipment should be defended by taking customary measures. In other case, it can be easily caught by the corrupt officials. Defensive measures are taken by the exporters/importers under these circumstances and attack can be made by the corrupt officials. Shipment becomes a game of probability in this situation. A particular shipment can be lost, which can decide about the transaction costs and price markup. The chance of a shipment departure from the initial point and reaching the final point is involved in this condition. It can be assumed that some value proportions or part of shipment can be lost. The level of corruption highlights that there is increased loss chance that ultimately result in enhanced price markups. The hidden tax on the international trade is equivalent to the high markup price. This reduces the level of trade between two countries.

2. Literature review

2.1 *Influence of Trade on different Regional Trade Integrations*

The bilateral trade increases with the decrease in trade barrier in the SAARC region (South Association for Regional Cooperation). Moreover, it was discovered by Doan and Xing (2018) that CMEA and EEC regional trade was enhanced in the duration 1960-1994. Mediterranean countries were examined by Andersson and Sundqvist (2018) with EU to find whether the export of these countries to EU increased when the free trade area deal was sealed by Barcelona conference of 1995 between the two regions. It was analyzed that the bilateral trade was increased by 140 percent above the forecast between the two countries, which was discovered in the gains of regional group of ASEANs and its members. At the same time, it was discovered by Karemera, Whitesides, and Smalls (2017) that trade was induced between the groups because of the convincing outcome for EFTA and EEC for the years 1965-1976. It was analyzed that the trade of SAARC with the non-member countries can increase in general. During the years of 1960-1994, more trade was done by the member countries of EEC with the countries outside the region. It was discovered that trade of ASEAN countries with non-ASEAM has increased. The economic benefit of integration of region was analyzed by Öncel and Lubis (2017) on Vietnam through use of CGE model (computable general equilibrium). The research included the countries i.e. Indonesia, Japan, China, Malaysia, Philippines, and some East Asian economies. The welfare level and distribution of income for Vietnam increase with the regional integration. The income and household consumption increased that benefited the poor people. The access to bigger markets was facilitated through removal of tariffs between the trading members in the region, which increased the level of exports.

An investigation was carried out on the outcomes of RTAs for EU for improving economic growth between the member countries. It was discovered by researcher that there is a positive relation between the growth and trade. There is considerable difference between the convergence of knowledge and external trade. A great influence of knowledge spill over is created on the growth. There is a relation of knowledge transfer between growth and TFP. Moreover, the advantages and disadvantages of integration agreement for regional trade in the EAC (East African Community) were examined by Nguyen and Kim (2019). The benefits of integration of trade in the CARs (Central Asian Republics) were investigated through use of CGE (computable general equilibrium) and it was found that this agreement was a considered part of integration. Moreover, it was found that there is need for development in some of the sector. In this way, the benefits of intra industry trade were recognized.

A research was carried out by Park and Park (2016) on the trade era of MENA's trade by using reforms and RTAs of trade facilitation to revive the trade status of MENA to create more jobs, improve economic growth and welfare. A research was conducted by Cheng (2005) on 44-57 countries with reference to imports and export to deal with the influence of regional alliance on the flow of bilateral symmetric trade. Therefore, the regional and individual agreements along the line of trade are weak. It was discovered that the size of exports and market of China was enhanced after it joined the regional group of ASEANs. Therefore, the researcher pointed that there is no evidence that the export plan of ASEAM was reduced by imports from China. The results revealed that for the export/import, China has been a considered figure in the regional group, which has not restricted the level of intra trade in ASEAN. A research was conducted by Athukorala (2012) on the regional group for development of the economies in the Asia over the years 1985-2008. The research employed standard model of gravity. The forecasting showed that the trade of non-oil products is expected to increase by 8.2% over the next three decades. However, the share of intra trade in the regional for non-oil products is likely to increase by 53-58% until 2030. There will be an increase of 39-4% in the trade to GDP in 2010 and 74.4% over the next two years.

2.2 *Trade and FDI*

FDI and trade have been proved empirically in different parts of the world such as AU, ACP, and ASEAM. The researcher discovered that the trade is improved by regional integrated by 65% for EC and for ANDEAN and MERCOSUR 65% (Bergstrand, Egger, & Larch, 2016). It was indicated by Glick and Rose (2016) that large effect on intra trade in the region is caused by most RTAs. This research was extended by analyzing the influence of RTAs and it was found that the effect can be positive or negative. It can be either trade diversion or trade creation. Since 1990s, irrespective of the new period of regionalization, the intra-regional trade has not been improved by the new and old blocks. In other words, the intra-regional integration has not been strengthened. Trade diversion has been caused by EFTA and EU. However, the other blocks have resulted in creation of trade. Moreover, new empirical findings were given by (Velde, Page, & Morrissey, 2017) for Free Trade of the Americans. It revealed that there is a significant influence of preferential tariffs on the agreement of bilateral trade.

FDI is enhanced through Regional Trade Agreements in the region. Moreover, the outcomes of regional trade rules along with FDDI were recognized by Salim, Razavi, and Afshari-Mofrad (2017) to have a deep understanding about the roles of FDI and trade relation to trade barriers. It was found that these are based on the present rules. These can influence the rules, which result in changes for trade and FDI accommodation. The integration can be experienced low or with no effect when the countries and region are merged together. It was indicated by Salim et al. (2017) that efficiency and growth increased with greater regional integration. It was suggested that poor countries can be encouraged to trade in the regional group and investors can be attracted from the outside region. This results in unequal distribution of cost and gains between members of regional integration. An investigation was carried out by using a sample of 71 developing countries between the years 1980-99 to find that FDI has great attraction in these regions. It was indicated that FDI could transfer to RTA countries from non-RTA countries. An increase in the size of market was recorded in the Maghreb region, which enhanced the stock

of FDI at 165% Tunisia, 85% for Morocco, and 62% for Algeria. Estimation was carried out by Wilson and Bala (2019) through use of estimation model including real stock of FDI for UK and US over the years 1980-2000 among the developing countries. It was found that the regional members were not significant in relation to the FDI inflow. Further, the FDI inflow to the regional group improves with the membership for a specific region and freedom of trade such as foreign firms and trade preferences.

The convergence and divergence is another issue that happens in a region. It was found that size of region and economy of a country reflects the FDI inflow. The closeness of a country and the distance also determines the increase in FDI. The FDI can be improved with closeness in long run such as in the regions of MERCOSUR and NAFTA. For these two groups, there has been increase in FDI as compared to COMESA, ASEAN, which are still in the initial years of investment planning. Some evidences have been given by researchers including Rahmouni and Debbiche (2017) Pain and Lansbury (1996) and Ojide, Chigozie, and Eke (2016) for the influence of RTAs on FDI such as liberalization. The findings of the researchers show that FDI is enhanced by RTs and the results are mix for some region. The expected outcome can be because of region experience with the individual country influences created under the investment planning or trade. There can be size difference in the industrial sector of the countries in a given and the level of openness to the integration, which can be indirect or direct.

2.3 *Theoretical model*

Rybczynski Theorem According to the Rybczynski theorem if the labor-capital ratio differs, then an increase in the endowment of one factor would increase the output of that industry which uses that factor intensively and would result in the reduction of other industry's output, at constant commodity prices. This theory generally accounts for the strategies to target output through factor endowment, with a purpose of analyzing the way resource endowment could affect the output volume. In addition, the factor equalization theorem is an economic theory in which commodity price is used to uniquely determine the factor prices. However, the frictionless trade would only occur in factor price equalization (FPE) among the trading countries, if both countries are identical or possess homogeneous features and technologies and have similar factor endowments.

Boianovsky (2019b) suggested that the chances of factor price equalization (FPE) improves with the increase in output. According to Rajapakse (2019) there are some issues with the Heckscher-Ohlin theory, but this theory has provided useful explanation regarding how income distribution influences through trade. Furthermore, also mentioned the significant role of Heckscher-Ohlin theory in the trade development theory, which has been existing in the literature for the past sixty years. Specific Factor Model (SFM), which is an international trade theory was also proposed for describing how an industry's specific factor of production may influence the trade pattern

During early 1970's, new trade theory has been developed that gave rise to a new trend of describing the process of international trade. Various researchers (Schweighofer-Kodritsch, 2018; Shiny & McKenzie, 2016) have reexamined this trade theory to modify it through various ways. This theory does not involve the assumption of constant returns to scale and highly depends upon industries with economies of scale. In addition, this theory is based upon two main factors, namely perfect competition and strategic interaction. The theory states that countries should not only trade with other countries on the basis of comparative advantage rather they must also take account of economies of scale and increasing returns to scale.

Similarly, New Economic Geography theory has also been surfaced, aiming to provide a detailed explanation that why industries within certain countries or regions bunch up. This theory assumes that industries generally involve in clustering because of economic agglomeration. It is commonly viewed as an economic development theory. The New trade theory and New Economic Geography theory have been derived and developed by Paul R Krugman, who received a Nobel prize in Economics in 2008, because of his great contribution in developing these theories. In addition, Vernon product cycle was also surfaced which particularly emphasizes upon

institutions, such as patenting and intellectual property rights. According to Pearson (2017), such characteristics when combined with homogenous demand may facilitate in developing homogeneous industries. Therefore, those countries with similar features can involve in trade by offering product variety to each other. Those countries having similar demand would tend to trade more as compared to those countries with non-homogenous demand. In international trade, a firm's function is to analyze host economy's supply side. The production function of this theory has a common feature that all factors of production are combined to convert these factors into consumption goods.

A multinational theory refers that a firm operates in more than two countries, and it must offer two types of servicing. Other than exporting alternative, developing a production plan is another alternative to provide services and products in the foreign market. The issues that were identified in basic gravity model have gained the attention of a few researchers. These researchers reexamined this model to develop strong foundation similar to trade model. Thus, in order to resolve issues in basic model, it is important to modify some basic assumptions. For this purpose, Linder (1961) has attempted to resolve and address the issues that were arise in previous model. Similarly, various other researchers have also directed their efforts and attention to develop a theoretical foundation for the gravity model, one of those are Anderson and Van Wincoop (2003) namely the 'gravity with gravitas'. Based on the demand function, Anderson and Van Wincoop (2003) have formulated a gravity model. However, consumer preferences form the basis for a constant elasticity of substitution. Thus, there must be 'love for variety' among consumers, signifying that consuming differentiated products increase consumer utility. On the production side, Krugman (1979) put forward some basic assumptions, stating that each firm must be capable of producing unique product variety to obtain increasing returns to scale.

This assumption allows firms to involve in fixed mark-up pricing and vanishes the assumption of fundamental interactions, competition, and large number of firms. When equilibrium is established, the difference of price and marginal cost equals the fixed cost required for entering into the market. It is the producer who decides whether to sell goods in local or foreign market. For model simplification, it is assumed that local product selling would not involve any transportation cost whereas, selling same product in foreign market would involve the transportation cost. On the other hand, consumers can purchase variety of products both from local and international markets. However, the internationally produced product price would involve the cost of transporting goods from one to the other country. The derivation of this model is the building block which provide the grounds for achieving equilibrium position, at this point local and international firms and producers transact with each other. The basic gravity model enables to contemplate each firm's total export volume. Combining all firms in a country allows to derive a country's total value of exports, which acts as dependent variable in the gravity model

$$\log EXIN_{ij}^k = \log ECNG_i^k + \log EXP_j^k - \log WECNG^k + (1 - \phi_k) \{ \log TC_i^k - \log \pi_i^k - \log MR_j^k \}. \quad (1)$$

$$\pi_i^k = \left[\sum_{j=1}^c \left(\frac{TC_i^k}{MR_j^k} \right)^{1-\phi_k} \right] * \frac{EXP_i^k}{ECNG^k} \dots \quad (2)$$

$$MR_j^k = \left[\sum_{i=1}^c \left(\frac{TC_i^k}{\pi_i^k} \right)^{1-\phi_k} \right] * \frac{ECNG_i^k}{ECNG^k} \dots \quad (3)$$

Where, $EXIN$ is the export of the index, $ECNG$ is the economic growth, $WECNG^k = \sum_{i=1}^c ECG_i^k$ is the world economic growth, EXP represents expenditures as percentage of GDP, ϕ_k is the elasticity of substitution of intra-sectoral between varieties, TC represents trade cost, π_i^k represents the outward multilateral resistance that captures all export from country i to country j depending on the trade cost across all potential export markets, and finally MR_j^k inward multilateral resistance that captures that import dependency from country j to country i depending on trade costs from the potential suppliers.

Combinations of these two terms remain the key to the model and successfully correct the problem facing intuitive gravity model. In all bilateral routes, the multilateral resistance terms require trade costs. The relative price change of one route can affect the trade flow of other routes. Since the previous intuitive gravity model does not include outward and inward multilateral resistance variables but they are correlated with trade cost. Even there is evidence of classic omission of variables biasness in intuitive gravity model i.e. other variables that directly affect trade.

However, the following key points are to be taken into consideration for gathering data under theoretical gravity model. Some literatures used dependent variables as logarithm of total trade for a country i.e. the addition of imports and exports or rather they use the average of exports in both ways. Theoretical gravity model indicated that such an approach might leads to misleading or confusing results; hence, the direction of each trade should be in a single flow (unidirectional export flows). For instance, export from Nigeria to Benin should be recorded in a single line, and export from Benin to Nigeria should be recorded in a single line too. That is for a country pair. The second observation noticed in the literature is whether trade values should be reported in real or nominal terms, there is no serious issue regarding that but at the same time we needs to take note if we are using cross sectional gravity model or time series in order to determine which one to use. As for cross –sectional no issue using trade values reported in real or nominal terms because regardless of any scaling used whether uniform or factor applied, the result will still be the same.

However, as for time series the answer is straight and clear because in line with the theory, trade flows should not be in real terms rather it should be in nominal terms. This is due to the fact that export are usually deflated under the two multilateral resistance e.g. GDP deflator or CPI (prices indices or deflating export) cannot be adequately identify the unobserved multilateral resistance, which can leads to misleading results. Another aspect to take note is the GDP data, where it should be in nominal and not real terms.

Since they are also deflated with the multilateral resistance terms, i.e. unobserved price indices, also deflated by price index that is observable and other factors might likely lead to misleading results. Gravity model make it clear to include sectoral expenditure including output rather than GDP. Furthermore, this is impossible to prove empirically especially when developing nation are included. Gravity model specification must include trade costs for estimation purpose i.e. trade costs. In literatures, this function is specified as a term of observable variables, which is assumed to be affecting trade costs when using log-linear specification in a simple form, hence we can generate trade costs function as:

$$\log TC_{ij}^k = h_1 \log DIS_{ij} + h_2 \log Uni_{ij} + h_3 \log Lang_{ij} + h_4 \log Colony_{ij} \dots (4)$$

Where, **DIS** represents geographical distance between two countries, **Uni** measures unity between countries with the same land border , **Lang** represents countries with the same language that is officially recognise , and **Colony** represents countries that share the same colonial relationship These formulations represent a typical gravity model, which is in line with the literatures of gravity model; this particular model has been described as a significant determinant of bilateral trade. Most researchers argue to include policy related variables. Another important issue to take note is that trade cost cannot be separated from elasticity of substitution i.e. elasticity of trade cost (h term) during estimations. Hence the two must be multiplied together, it was suggested that we need to be very careful when interpreting the estimated coefficient differences concerning different sensitivity level on various sectors under trade cost factors. For us to find the elasticity of pure trade cost, there is a need to interact cost variables with substitution of elasticity when estimating, whether using model-based estimates or general assumption. According to scholar, in application most researchers do not follow it.

$$U_i = \sum_{k=0}^k \left[\int_{D_{EV}^k} \{Z_i^k(ver)\}^{1-\frac{1}{\phi_k}} dZ_{dVER} \right]^{\frac{1}{\phi_k}} \dots (5)$$

U_i = Represent different varieties consumed by country I while $Z_i^k(ver)$ signifies the amount of variety v consumed from sector k in country I, thus $MR_i^k(U)$ represent the unit price. V symbol represent (discrete number of varieties) a subscript and integrals replaced by sums. The total sums of sectoral utilities represent the utility function, which is equally weighted. The restriction can be removed by adding the entire subsector or sectoral utilities using Cobb-Douglas function of utility, while accommodating different weights. The tendency of existence of exogenous depends on the longer shares of the model. This is in line with other basic result such as: Chaney (2008) is a typical example of what alternative expression look like. Anderson and Van Wincoop (2003), consider using a single sector in order to avoid cluttering up the algebra with more indices. However, putting this issue into consideration it is very important to consider disaggregation of some sectors in order to critically examine the other key implications of data that flows from the model using multi-sector circumstances.

$$EXP_i = \left(\sum_{k=0}^k \left[\int_{(V*EXP*U)_i^k} \{MR_i^k(U)\} * Z_i^k(ver) dv \right] \right) = \sum_{k=1}^k EXP_i^k \dots (6)$$

Consumers are faced with the problem of what to choose concerning in v in order to maximize equation (2.7) in relation to (2.8). The Lagrangian can be stated as follows:

$$LNG = \left(\sum_{k=0}^k \left[\int_{(V*EXP*U)_i^k} \{Z_i^k(ver)\}^{1-\frac{1}{\phi_k}} dZ_{dVER} \right]^{\frac{1}{\phi_k}} \right) - \left(\eta \sum_{k=0}^k \left[\int_{(V*EXP*U)_i^k} \{MR_i^k(U) * Z_i^k(ver) dv \right] \right) \dots (7)$$

Assuming first order condition concerning quantity with the aim of setting it to zero will gives:

$$\frac{\partial LNG}{\partial Z_i^k(ver)} = \left[\frac{1}{1-\frac{1}{\phi_k}} \sum_{k=0}^k \left[\int_{(V*EXP*U)_i^k} \{Z_i^k(ver)\}^{1-\frac{1}{\phi_k}} dZ_{dVER} \right]^{\frac{1}{\phi_k}} \right] * \left[\left(1 - \frac{1}{\phi_k} \right) Z_i^k(ver)^{\frac{1}{\phi_k}-1} \eta MR_i^k(ver) \right] = 0 \dots (8)$$

Determine $\sum_{k=0}^k \left[\int_{(V*EXP*U)_i^k} \{Z_i^k(ver)\}^{1-\frac{1}{\phi_k}} dZ_{dVER} \right]^{\frac{1}{\phi_k}}$, rearrange, and regroup the terms to show

$$\eta MR_i^k(ver) = \left[\frac{Z_i^k(ver)^{\frac{1}{\eta}}}{\int_{(V*EXP*U)_i^k} \{Z_i^k(ver)\}^{1-\frac{1}{\phi_k}} dZ_{dVER}} \right] * EXIN^k \dots (9)$$

Rearrange once again, total all kinds together in a sector, then multiply all by the prices by applying Lagrangian multiplier to solve the problem

$$\begin{aligned} [\theta MR_i^k(ver)] * Z_i^k(ver) \\ = \eta^{-\phi_k} (MR_i^k(ver)^{1-\phi_k} (EXIN^k)^{\phi_k}) \left[\int_{(V*EXP*U)_i^k} \{Z_i^k(ver)\}^{1-\frac{1}{\phi_k}} dZ_{dVER} \right]^{-\phi_k} \dots \dots \dots (10) \end{aligned}$$

$$\int_{(V*EXP*U)_i^k} \{MR_i^k(U) * Z_i^k(ver) dv\} = EXP_i^k \dots \dots \dots (11)$$

$$EXP_i^k = \eta^{-\phi_k} (MR_i^k(ver)^{1-\phi_k} (EXIN^k)^{\phi_k}) \left(\int_{(V*EXP*U)_i^k} \{Z_i^k(ver)\}^{1-\frac{1}{\phi_k}} dZ_{dVER} \right)^{-\phi_k}$$

$$* \int_{(V*EXP*U)_i^k} \{Z_i^k(ver)\}^{\phi_k} dv \dots (12)$$

$$\eta = \left[\frac{\int_{(V*EXP*U)_i^k} \{MR_i^k(ver)^{1-\phi_k} dv\}^{\frac{1}{\phi_k}}}{EXP_i^k} \right]^{\phi_k} * \left[\frac{EXIN_k}{\int_{(V*EXP*U)_i^k} \{Z_i^k(ver)\}^{1-\frac{1}{\phi_k}} dZ_{dVER}} \right] \dots (13)$$

Therefore, to obtain a demand function, substitution method needs to be applied by substituting the Lagrangian multiplier back to first order condition of equation (11):

$$\frac{Z_i^k(ver)^{\frac{1}{\theta_k}}}{\int_{(v*EXP*U)_i}^1 \{Z_i^k(ver)\}^{\frac{1}{\theta_k}} dVER} = \left(\left[\frac{\int_{(v*EXP*U)_i}^1 \{MR_i^k(ver)^{1-\theta_k} dv\}^{\frac{1}{\theta_k}}}{EXP_i^k} \right] * \left[\frac{EXIN_k}{\int_{(v*EXP*U)_i}^1 \{Z_i^k(ver)\}^{\frac{1}{\theta_k}} dVER} \right] * [MR_i^k(ver)] \dots (14)$$

4)

$$Z_i^k(var) = \left(\frac{[MR_i^k(ver)]^{-\theta_k}}{Z_i^k(ver)} \right) * EXP_i^k \dots \dots (15)$$

$$Z_i^k(var) = \left(\frac{[MR_i^k(ver)]^{-\theta_k}}{Z_i^k} \right) * \left(\frac{EXP_i^k}{Z_i^k} \right) \dots \dots (16)$$

Where, $\int_{(v*EXP*U)_i}^1 \{MR_i^k(ver)^{1-\theta_k} dv\}^{\frac{1}{\theta_k}} = MR_i^k$ represent CES price index for sector k in country i. The problem facing producer's in this model is how to maximize profit at minimum cost. Assuming large number of firms, strategic interaction disappears, markup of firm charges remains constant under the general model. In this section, equilibrium pricing equation and equilibrium demand equation formulated in the previous section will be used to generate gravity model, then each country i measure for all active firms regarding sector also all the firms are differentiated with unique product. To measure the aggregate of the worldwide product for each sector is $\sum_{i=1}^c N_i^k$. Per unit of product produce; each firm will have to pay a certain sum of amount which is fixed cost fc_i^k with a variable cost vc_i^k at .wage rate $wr_i^k =$. Therefore, a firm's profit is specified as:

$$\pi_i^k(var) = [MR_i^k(var) * Z_i^k(var)] - [(MR_i^k * wr_i^k * vc_i^k)(ver)] - [wr_i^k * fc_i^k] \dots (17)$$

Under different varieties, we do not need to assume whether to use quantity or Bertrand (price) competition. Therefore, if Bertrand plays out, then first order condition hold:

$$\frac{\rho \pi_i^k(var)}{\rho MR_i^k(var)} = Z_i^k(var) + MR_i^k(var) \frac{\rho Z_i^k(var)}{\rho MR_i^k(var)} - (wr * vc)_i^k \frac{\rho Z_i^k(var)}{\rho MR_i^k(var)} = 0 \dots \dots \dots (18)$$

to solve for prices:

To adjust the expression above, explanation on partial is needed, evaluation with the use of demand function of equation (17) is considered, taking note of large group based on assumption. Therefore, any slight change in any firm's price (one) will not affect the general price level of the sector because many firms are in competition. In view of this, the equation can be written as

$$Z_i^k(var) = (wr * vc)_i^k \frac{Z_i^k(var)}{\rho Z_i^k(var)} \dots \dots (19)$$

Using first order condition under profit maximization, we can rewrite the equation as:

$$Z_i^k(var) = (wr * vc)_i^k + Z_i^k(var) \frac{MR_i^k(var)}{\theta_k Z_i^k(var)} \dots \dots (20)$$

If we rearrange and solved for price the equation is going to give:

$$Z_i^k(var) = \frac{1}{\theta_k} Z_i^k(var) = Z_i^k(var) \left(1 - \frac{1}{\theta_k} \right) = (wr * vc)_i^k \dots \dots (21)$$

$$Z_i^k(var) = \left(\frac{\theta_k - 1}{\theta_k} \right) (wr * vc)_i^k \dots (22)$$

The firm's marginal cost of production is on the right-hand side of equation (24). Bracket represent the constant markup with the sector, it is assumed that the numerator must be greater than the denominator, in view of this positive wedge existing between marginal cost, price and factory firm's gate. It is assumed that wedge rely on elasticity of substitution of sectors which is constant to all firms under this sector. If the same good produced by country i is consumed by country j then marginal cost is under this assumption, costless trade must match with while must match additional one including ad valorem tariff rate. Therefore, trade friction is linked with a particular coefficient but does not depend on the size of goods shipped. Hence iceberg costs are treated as variable

cost but not fixed. Under any given two countries i.e. country i and j, iceberg trade cost means that country j rice of goods that was produced in country i is from equation (24) as shown above:

$$Z_i^k(var) = \left(\frac{\theta_k - 1}{\theta_k} \right) TC_{ij}^k (wr * vc)_i^k \dots (23)$$

If we rewrite the country price index into a general form:

$$Z_i^k(var) = \int_{(v * EXP * U)_i^k}^1 \{ (TC_{ij}^k * MR_i^k) (ver)^{1-\theta_k} dv \}^{\frac{1}{1-\theta_k}} \dots (24)$$

Conditions to take note, the country price index include different varieties produced and consumed by the same country. This means a set to unity, in order to show the absence of likely barrier faced by internal trade.

3. Model estimation

The long run relationship has been examined and analyzed through the use of Johansen cointegration method. This approach was developed by Johansen and Juselius (1990). The method revolutionized way of estimating long run and short run relationship for multivariate equation. It has the advantage over Engle and Granger (1987) approach in that it tests for cointegration by determining the cointegrating vectors and number of cointegrating vectors between the variables. Johansen and Juselius method also consider all variables as latent endogenous variables, thereby averting the exogeneity problem. In addition, Johansen and Juselius model can estimate the causal relationship between variables as the causality estimation is embedded in VECM. Lastly, it uses maximum eigenvalue and trace statistics in determining the number of cointegrating relationships with expected signs of the coefficients. Engle and Granger approach determines the cointegration by testing the stationarity of the residual only.

The Johansen cointegration approach has the ability of expanding single equation for an error correction model to multivariate equation. Suppose that the CO_2 emission is represented by Z_t , political freedom W_t , economic freedom X_t by and GDP growth by Y_t take the form as

$$Z_t = [Y_t, X_t, W_t] \dots (25)$$

The AR model of equation can be

$$Z_t = A_1 Z_{t-1} + A_2 Z_{t-2} \dots A_k Z_{t-k} + \varepsilon_t \dots \dots \dots (26)$$

Equation (26) may be altered to VECM as given in equation (27)

$$\Delta Z_t = \Gamma_1 \Delta Z_{t-1} + \Gamma_2 \Delta Z_{t-2} \dots \Gamma_{k-1} \Delta Z_{t-k-1} + \Pi Z_{t-k} + \varepsilon_t \dots \dots \dots (28)$$

Where, $\Gamma_1 = [I - A_1 - A_2 - \dots A_k]$, $i=1, 2, 3 \dots k-1$

$$\Pi = -(I - A_1 - A_2 - \dots A_k)$$

Therefore, Π is a 3 by 3 matrix because of assumed three variables. This can be broken as $\Pi = \alpha\beta$ where α contains the speed of adjustment towards equilibrium. Whereas the β is the long run coefficient., and βZ_{t-1} is an error correction term. For a simplistic example, takes $k=2$ equation (28) can be written as

$$\begin{bmatrix} \Delta Y_t \\ \Delta X_t \\ \Delta W_t \end{bmatrix} = \Gamma_t \begin{bmatrix} \Delta Y_{t-1} \\ \Delta X_{t-1} \\ \Delta W_{t-1} \end{bmatrix} + \begin{bmatrix} \alpha_{11} & \alpha_{12} \\ \alpha_{21} & \alpha_{22} \\ \alpha_{31} & \alpha_{32} \end{bmatrix} \begin{bmatrix} \beta_{11} & \beta_{12} & \beta_{13} \\ \beta_{21} & \beta_{22} & \beta_{23} \end{bmatrix} \begin{bmatrix} Y_{t-1} \\ X_{t-1} \\ W_{t-1} \end{bmatrix} + \varepsilon_t \dots \dots \dots (29)$$

the equation (29) can be written as

$$\Pi_t Z_t = [\alpha_{11}\beta_{11} + \alpha_{21}\beta_{21}][\alpha_{21}\beta_{12} + \alpha_{22}\beta_{22}][\alpha_{31}\beta_{13} + \alpha_{32}\beta_{23}] \begin{bmatrix} Y_{t-1} \\ X_{t-1} \\ W_{t-1} \end{bmatrix} \dots \dots \dots (30)$$

The equation can be transformed into yield equation as

$$\Pi_t Z_{t-1} = \alpha_{11}(\beta_{11}Y_{t-1} + \beta_{21}X_{t-1} + \beta_{31}W_{t-1}) + \alpha_{12}(\beta_{12}Y_{t-1} + \beta_{22}X_{t-1} + \beta_{32}W_{t-1}) \dots (31).$$

According to Enders (2004) α_{11} and α_{12} are speed of adjustment terms

Mathematical equation above can be incorporated into statistics just by including error term and then apply logarithm to the whole equation. Ordinary least square can also be used to estimate the model above. Cross section data can be used when bringing in trade relationship and trade effect in a particular period using classical model of gravity. Important information can find using cross section data over long period of time (panel

methodology) compare with cross section data only. There are various advantages attached to this method. Panel has the capability to capture applicable relationship between variables of interest over period of time. Another important feature of panel is that it can monitor unperceivable /unobservable trading partner pairs i.e. individual effect. Ordinary least square estimates exclude individual effect that causes biasness only when the individual effects are correlated to the regressors. Hence, panel methodology is employed using empirical gravity trade model. Gravity trade model states that distance (procurator for cost of transportation), GDP or GNP, each country population, culture similarities, GDP per capita, other economic factors and other variables which are dummy speak more about the bulk of trade whether import or export between countries X_{ijt} (pairs). Key variables included in the gravity model can either restrain or spur trade among countries of pairs. In order to answer specific objective, one as stated above, export model is depicted below.

$\ln EXP_{ijt}$ =

$$\alpha_1 \ln DIS_{ijt} + \alpha_2 \ln ECNG_{ijt} + \alpha_3 \ln ECNG_{ijt} + \alpha_3 \ln Uni_{ijt} + \alpha_4 \ln Lang_{ijt} + \alpha_5 \ln Colony_{ijt} + \alpha_6 \ln PR_{ijt} + \alpha_7 \ln TROP_{ijt} + \alpha_8 \ln ASEAN_{ijt} + \varepsilon_{ijt} \dots (32)$$

$\ln IMPORT_{ijt}$ =

$$\alpha_1 \ln DIS_{ijt} + \alpha_2 \ln ECNG_{ijt} + \alpha_3 \ln WECNG_{ijt} + \alpha_3 \ln Uni_{ijt} + \alpha_4 \ln Lang_{ijt} + \alpha_5 \ln Colony_{ijt} + \alpha_6 \ln PR_{ijt} + \alpha_7 \ln TROP_{ijt} + \alpha_8 \ln ASEAN_{ijt} + \varepsilon_{ijt} \dots (33)$$

In order to answer objective one and two, a trade model for the entire market was proposed for ASEAN nations. In order to achieve the study's objectives, the following steps were taken in order to achieve unbiased estimation results.

$\ln IMPORT_{ijt}$ =

$$\alpha_1 \ln DIS_{ijt} + \alpha_2 \ln ECNG_{ijt} + \alpha_3 \ln WECNG_{ijt} + \alpha_3 \ln Uni_{ijt} + \alpha_4 \ln Lang_{ijt} + \alpha_5 \ln Colony_{ijt} + \alpha_6 \ln PR_{ijt} + \alpha_7 \ln TROP_{ijt} + \alpha_8 \ln ASEAN_{ijt} + \alpha_9 \ln BLT_{ijt} + \sum_r \beta_{10} \ln ASEAN * BLT_{ijt} + \varepsilon_{ijt} \dots (34)$$

This model examines the impact of institutional quality on ASEAN trade. Looking beyond the major determinants to examine the likely impacts of institution on ASEAN trade is imperative. The following steps were taken in order to achieve the fourth objective. Estimation technique employed was the Poisson pseudo-maximum likelihood estimation (PPML). This method was introduced into gravity modeling to capture the zero-trade matrix that usually occurs in trade (Export and Import). Sousa (2012) designed the method to capture zero trade matrixes, which is part of the nonlinear method of estimation. At default PPML estimation techniques are semi robust against likely bias. Our focus here is mainly on three variables, namely, the corruption index, political instability, and regulatory quality. In order to answer specific objective four-export model of gravity below is here by proposed.

$\ln EXP_{ijt}$ =

$$\alpha_1 \ln DIS_{ijt} + \alpha_2 \ln ECNG_{ijt} + \alpha_3 \ln WECNG_{ijt} + \alpha_3 \ln Uni_{ijt} + \alpha_4 \ln Lang_{ijt} + \alpha_5 \ln Colony_{ijt} + \alpha_6 \ln PR_{ijt} + \alpha_7 \ln TROP_{ijt} + \alpha_8 \ln corrup_{ijt} + \alpha_9 \ln PIN_{ijt} + \varepsilon_{ijt} \dots (35)$$

4. Results

The correlational analysis of the variables is shown in the table 1. The correlation value indicates that the all the variables used in the current study are highly correlated. The correlation between trade openness (TO), market openness (MO), Price stability (PRS), HDP growth (GDPG) and political stability (POLT) are shown in table 1.

The first and foremost in the Johansen cointegration test is that optimal lag length must be determined. The optimal lag length should be such that sufficient to be with white noise. Optimal lag length for obtaining the Johansen cointegration is based on the Vector Autoregressive Model (VAR). Then, lag order is obtained according to the information criteria (Enders, 2004).

Table 1. Correlations

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Lag(lnDIS)	1	1													
Lag(lnECNG)	2	-0.1830	1												
Lag(lnWECNG)	3	-0.0257	0.1483	1											
Lag(lnUni)	4	-0.0810	0.1188	0.8929	1										
Lag(lnLng)	5	0.1456	-0.4363	0.1129	0.0579	1									
Lag(lnColony)	6	0.1308	-0.2847	-0.0828	-0.0674	0.0882	1								
Lag(lnPR)	7	0.0220	0.2994	-0.1216	-0.0935	-0.3391	-0.0720	1							
Lag(lnTROP)	8	0.02310	0.2188	0.3929	0.1057	0.1057	0.2157	0.2474	1						
Lag(lncorup)	9	0.23456	-0.2363	0.3129	0.2674	0.2674	0.2474	0.3474	0.1721	1					
Lag(lnPIN)	10	0.2308	0.2347	-0.2828	0.2935	0.2935	0.1535	0.2345	0.2981	0.1826	1				
Lag(lnASEAN)	11	0.1220	0.2239	-0.1321	0.1674	0.1674	0.1874	0.1276	0.2019	0.2374	0.1765	1			
Lag(lnBLT)	12	0.2341	0.1872	0.1634	0.2235	0.2235	0.1235	0.1321	0.2301	0.7651	0.3235	0.2654	1		
Lag(lnIMPORT)	13	0.2323	0.4321	-0.3761	0.1674	0.2376	0.4327	0.3751	0.6541	0.8210	0.5482	0.7901	0.7862	1	
Lag(lnEXPORT)	14	0.2391	0.4871	0.2651	0.2235	0.4321	0.5431	0.7651	0.4311	0.0761	0.8631	0.8730	0.5430	0.3402	1

As vividly seen in Table 2, different information criteria suggested different optimal lag for cointegration. Akaike Information Criterion (AIC) chose two lag while Schwartz Information Criterion (SIC) suggested lag one. The two lags as suggested by AIC has been used. The aim is to have parsimonious and best results.

Table 2. Lag Length Selection Criterion

Lag	LogL	LR	FPE	AIC	SC
0	-730.929	NA	4.05e+12	46.058	46.332
1	-624.659	166.047*	5.24e+10*	41.667	43.590*
2	-585.566	46.418	5.58e+10	41.473*	45.046

Note: LR: sequence modified LR test statistics; FPE: final prediction error AIC: Akaike information criterion; SC: Schwarz information criterion HQ: Hannan-Quinn information criterion. * denote choice of lag.

Cointegration is all about long run relationship, among at least two variables which are non-stationary. The test for cointegration requires that the variables be integrated of the same order. The Johansen test uses trace test and maximum eigenvalue test determine the number of cointegrating equation. Table 3 presents the cointegration results.

Table 3. Johansen cointegration test

Dependent Variable:	Model 1	Model 2	Model 3
CO₂			
Lag(lnDIS)	0.0177***	0.3421***	0.2189**
Lag (lnECNG)	0.2371***	0.9531**	0.2441**
Lag(LnWECNG)	0.0198**	0.0154**	0.2170***
Lag(lnUni)	0.0272**	0.3951***	0.1493***
Lag(lnLng)	0.0254**	0.0238***	0.1243***
Lag(lnColony)	0.01432***	0.2281***	0.2711*
Lag(lnPR)	0.0222**	0.0313**	0.1284*
Lag(lnTROP)	0.1761**	0.0743**	0.2132**
Lag(Incorup)	0.0797**	0.0488*	0.2633***
Lag(lnPIN)	0.0332***	0.0943**	0.1980**
Lag(lnASEAN)	0.0177***	0.3215***	0.0089**
Lag(lnBLT)		0.6614***	
Lag (LnASEAN*lnBLT)		0.2311***	

These results are in line with Sandberg, Seale Jr, and Taylor (2006) and Thede and Gustafson (2012). Because all the variables were logged, the assumption was that the degree of the elasticity was unit less. However, the panel data used for these study is unbalanced due to missing datas especially from ASEAN countries Export, GDP per capita and GDP were incomplete; thus, applying second generation panel test tests to unbalanced panel data can create computational problems such as the Westerlund error-correction-based panel cointegration tests. Furthermore, we could not employ cross sectional dependency test and others; thus we stick to the first generation panel unit root testing and cointegration which was in line with Hondroyannis (2006). In summary, regardless of whether there is cross sectional dependency or otherwise, we rely on the assumption of Phillips and Moon (1999) that there is independence in the errors across cross-sections using dynamic models.

5. Conclusion

The main purpose of the study is to answer the research question how the nexus among the free trade, institutional quality and economic growth effect the trade from ASEAN countries the exports become uncompetitive because of such hidden tax and high production costs in ASEAN. It can be said that importer/importers can achieve competitive advantage by being involve in corrupt activities as compared to others who are not willing to give bribes. There is less influence of reduction of the tariff, which is based on the potential of intra region. It was discovered that the intra-regional trade reflects a small part of trade including the production. The influence of regional integration and FDI has been shown using a sample of 5 countries. It was found that trade is enhanced through FDI and regional trade. Several connecting relations between trade and FDI exist. A better productivity outcome, quality, and low prices can be achieved by high incorporation of market. FDI investments will be attracted with bigger incorporation of the market that suggests the positive outcome in long run.

The trade can be enhanced or hindered through corruption based on the willingness of firms in the exporting countries to offer bribes at a competitive level. Precisely, the focus of the discussion is on the channels through which global trade can be influenced. This shows that the main influence of corruption, which is an institutional quality on the global trade, is an issue to be empirically investigated. Considering this notion, the previous knowledge has been extended by including some other variables of institutional quality such as good governance, instability of governance and corruption by keeping the focus on flow of trade in ASEAN. Moreover, the data is allowed to decide whether the variables of institutional quality i.e. instability of government, corruption and good governance influence the trade across the border in a positive or negative way in the ASEAN countries. The findings of the study have provided support to the hypothesized results. These results are in line with Sandberg, Seale Jr, and Taylor (2006) and Thede and Gustafson (2012). Because all the variables were logged, the assumption was that the degree of the elasticity was unit less. However, the panel data used for these study is

unbalanced due to missing datas especially from ASEAN countries Export,GDP per capita and GDP were incomplete; thus, applying second generation panel test tests to unbalanced panel data can create computational problems such as the Westerlund error-correction-based panel cointegration tests. Furthermore, we could not employ cross sectional dependency test and others; thus we stick to the first generation panel unit root testing and cointegration which was in line with Hondroyannis (2006).

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Paitoon CHETTHAMRONGCHAI is a lecturer of Department of Marketing, Kasetsart Business School, Thailand. He holds Ph.D. in Marketing Management from the University of Manchester, England. His areas of expertise are Marketing Management and Modern Management.

ORCID: <https://orcid.org/0000-0002-9744-4358>

Kittisak JERMSITTIPARSERT holds Ph.D. in Social Sciences from Kasetsart University, Thailand. He is currently a researcher at Chulalongkorn University Social Research Institute, a part-time researcher at Ton Duc Thang University, and the secretary general of Political Science Association of Kasetsart University. His areas of expertise are Political Science, Public and Business Administration, and Interdisciplinary Research in Social Sciences.

ORCID: <https://orcid.org/0000-0003-3245-8705>

Sakapas SAENGCHAI is studying Ph.D. in Public Administration at Ramkhamhaeng University Thailand. He currently is Assistant Professor in Public Administration at the Faculty of Humanities and Social Sciences, Suan Sunandha Rajabhat University. His areas of expertise are Public and Private Administration and Interdisciplinary Studies in Social Sciences.

ORCID: <https://orcid.org/0000-0003-0883-1119>

Register for an ORCID ID:

<https://orcid.org/register>

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EFFICIENCY OF THE PUBLIC FINANCIAL SUPPORT GRANTED TO SOCIAL ENTERPRISES*

Marian Oliński

University of Warmia and Mazury in Olsztyn, Oczapowskiego 2, 10-719 Olsztyn, Poland

E-mail: olinski@uwm.edu.pl

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Abstract. The paper deals with investigating analysis that reveals the efficiency of financial support received by social enterprises. Recently, this specific type of enterprise has been gaining more and more interest among managers and scientists. Some of them even noted that the social enterprise can be considered as a business of the future. Nevertheless, the key to the successful functioning on the market and development of this kind of enterprises is the financial support. One of the sources of obtaining financial support by social enterprises are public funds from EU assistance programs. However, these funds should be used effectively, because they are public property and therefore belong to all citizens (taxpayers). Therefore, in addition to the formal requirements set out in individual European Union aid actions focusing mainly on social goals, a traditional approach to assessing the efficiency of investments focusing on the business goals of the capital donor is also needed. Thus, the purpose of the study was to assess the efficiency of financial support granted to social enterprises. Efficiency was examined in a traditional way as the ratio of financial benefits obtained by the state thanks to granting support in relation to the financial costs spent on this support. The subject of the study consisted of 22 social enterprises of various forms (social cooperatives, associations, foundations) from the Warmian-Mazurian region, which received financial support in 2017-2018. The results show that a significant amount of money invested by the state to help in the formation and functioning of social enterprises is returned to the state budget.

Keywords: social enterprise; financial support; efficiency

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1. Introduction

Social enterprises can tackle a wide range of social and environmental issues and operate in all parts of the economy (Defourny, Nyssens, 2008, p.205). Some people lack skills and knowledge, or are disadvantaged to successfully get a job in a competitive labour market (Potluka, 2017, p.5). Most often they are long-term unemployed and disabled (not only physically but also mentally).

Studying social enterprise has theoretical and practical benefits for scholars in the fields of economics and entrepreneurship. For economists, social enterprises represent evidence of an alternative to state and private market approaches to economic development (Ridley-Duff, 2015, p.44). This paper fits into this research area, but points out that the stimulation of socio-economic development should be rational and effective. In particular, support providers should be interested in efficiency, regardless of whether it is a private or public capital donor. However, in order to assess the efficiency of supporting social enterprises from public funds, it is necessary to develop appropriate methods and measurement tools. Therefore, the purpose of the paper was to assess the efficiency of financial support granted to social enterprises according to the developed proprietary methodology. The company needs an initial financial assistance or support and social enterprise is no exception. In most cases, it is necessary to fund throughout operations, since the main goal is to create social value (Akbulaev, Aliyev, Ahmadov, 2019, p.3). Nevertheless, creation of social value should also be considered from the point of view of economic efficiency.

The structure of the article is as follows: the theoretical part presents the concept related to the idea of a social enterprise. It presents controversy regarding the definition of a social enterprise, as well as a consensus developed regarding the recognition of the dual nature of this type of enterprise (already at the definition level). Then the theoretical approach to efficiency was presented, emphasizing the meaning of the term in the context of the public sector and the spending of public funds. Both theoretical parts have been kept to a minimum due to the existence of extensive literature on both issues. Then, research methodology was presented, in which the purpose and research question were presented. The description of the research sample and the research methods used are also presented here. Then, the results were presented, which was limited to presenting the obtained results, while their interpretation was included in the discussion part. The whole article is summarized in the conclusions, in which also the research limitations are presented.

2. The theory of a social enterprise

Social enterprise is a concept which has different meanings across countries and regions. Nevertheless, the concept of social enterprise almost always combines two attributes: "entrepreneurship" and "sociality". The first of them indicates that it is about an organization that conducts business activity, and thus produces products or services, combining available material and intellectual resources in a way that creates added value, i.e. economic surplus. In turn, the attribute "sociality" indicates on the one hand the basic resources that the company uses, and on the other its mission. When it comes to resources, the essence lies in relying on social capital shaped within a particular local community. In relation to the mission, the basic thing is that the company's operation is focused on social integration on the scale of a given local community, and from another perspective, its main goal is to counteract social exclusion through professional and economic activation. The term social enterprise itself was introduced to distinguish new entrepreneurial activities from the traditional third sector [Bacchiaga, Borzaga 2003, s. 27].

The target (ideal) model that should characterize a social enterprise has also been introduced. For example, according to EMES the defining characteristics of the social enterprise “ideal type” include:

1. A continuous activity producing goods and/or selling services (economic dimension),
2. A high degree of autonomy (economic dimension),
3. A significant level of economic risk (economic dimension),
4. A minimum amount of paid work (economic dimension),
5. An explicit aim to benefit the community (social dimension),
6. An initiative launched by a group of citizens (social dimension),
7. A decision-making power not based on capital ownership (social dimension),
8. A participatory nature, which involves the persons affected by the activity (social dimension),
9. Limited profit distribution (social dimension) (Defourny, Nyssens, 2010, p. 12).

The easiest way, however, is to define a social enterprise as an organization trying to apply business solutions to social problems (Thompson, Doherty, 2006, p. 361). This approach is indicated by 10 sample definitions presented in Table 1.

Table 1. Definitions of social enterprise

Nr	Definition	Authors
1.	Organisation with an overarching core social mission funded through market-based initiatives	M.P. Miles, M.L. Verreyne and B. Luke (2014, p. 550).
2.	Ordinary commercial entity that generate income through the exchange of goods and services, but operate with the added social objective of providing work opportunities to people who have experienced persistent difficulties finding or maintaining employment	A. Chan (2016, p. 1719-1720).
3.	Organisation that pursues a social mission through the use of market mechanisms	V. Pestoff and L. Hulga (2015, p. 1752).
4.	A kind of business model which meets both social and economic objectives , contributing to labour market integration and social cohesion.	Y.Ch Cho and Jang (2014, p. 119).
5.	complex social issues because they combine the efficiency and resources of the traditional business model with the sense of mission of the charity one	T. Ramus and A. Vaccaro (2017, p. 307).
6.	Private organization that typically pursue goals other than profit: its main purpose is not to generate financial gains for their owners or stakeholders but to provide goods and services either to their members or to the community at large	D. Staicu (2018, p.909).
7.	Organization which places a high value on its independence and on economic risk-taking related to ongoing socio-economic activity.	European Research Network (2013).
8.	Business with primarily social objectives whose surpluses are principally reinvested for that purpose in the business or in the community, rather than being driven by the need to maximize profit for shareholders and owners	Department of Trade and Industry (2002).
9.	Organization with dual-purpose businesses that mediate profit goals with social objectives.	Kerlin J.A. (2006, p.248).
10.	Private, autonomous institution that is engaged in the supply of services and goods with a merit or general-interest nature in a stable and continuous way.	G. Galera, C. Borzaga (2009, p.215).

Source: composed by author according to the literature indicated in the table

Summarizing, scholars have yet to agree a universal and distinctive definition of social enterprise. The profusion of definitions found in the first decade of the twenty-first century is gradually giving way to an emerging consensus that the aim of social enterprise is to achieve economic, social and environmental value by trading for a social purpose (Haugh, 2012, p.9). This consensus is indicated by the definitions presented in Table 1. Therefore, in the research part and the interpretation of the results, the dual nature of such enterprises was also taken into account.

3. Efficiency of the public support – theoretical approach

Effectiveness and efficiency are exclusive performance measures, which entities can use to assess their performance. Efficiency is oriented towards successful input transformation into outputs, where effectiveness measures how outputs interact with the economic and social environment (Bartuševičienė, Šakalytė, 2013, p.41). Representatives of management sciences place great emphasis on linking the concept of economic efficiency with the principles of rational operation and principle of economical production. The principle of economical production is appropriate for every business entity - this also applies to social enterprises. This entity may strive to achieve a given objective with minimal use of resources, or may strive to maximize the objective with pre-defined measures. It may also choose intermediate routes between maximizing the goal and minimizing the means - but in each case we are dealing with the implementation of the principle of economical production. There are two basic reasons for the link between the principle of economical production and economic efficiency. First of all, a close connection (especially visible in the field of management sciences) of efficiency with the issue of defining and achieving the organization's goals. Secondly, the inclusion of two basic categories in the process of achieving these goals, namely effects and outlays. Therefore, most definitions of economic efficiency are specified as the relation of a particular effect to a given factor of production or a set of factors of production (Matwiejczuk, 2000, p.27). If we add to these two quantities the fact that everything must take place and be assessed in a given time, it can be stated that the economic effectiveness of development processes is determined by three components: inputs, effects and time (Wesołowski, 1996, p. 133). From this perspective, the scientific research presented in the empirical part of the paper was carried out.

The high visibility of social enterprise in academic, practice and policy circles has created a vibrant arena for theory testing, advances and development (Haugh, 2012, p.7). One of such arenas is the issue of efficiency in supporting social enterprises. Efficiency is a term used in both colloquial and scientific language (especially in the field of economic sciences). While the colloquial application does not require strict operationalization of this concept, its use in economic and social practice requires not only the precise definition of the concept of efficiency, but also the construction of methods and tools for measuring this efficiency. Although social enterprises integrate the economic and social dimensions in their activities, efficiency is only one of the parameters that can assess the functioning of these organizations, but often in relation to such enterprises there is a situation in which public funds are distributed, and therefore measures belonging to the general public, which is an argument in favor of giving the greatest importance to the issue of efficiency. Proper measurement of the value of effects forces the scientist to capture the quantity and quality of goods and services produced. In the private sector, a market mechanism allows this (price level determines the value of effects). In the public sector, in which a significant part of the goods and services produced is distributed outside the market mechanism, this seems much more difficult (Przygodzka, 2008, p. 162). In this perspective, building appropriate tools to monitor social efficiency should be a safeguard against waste of resources.

4. The research methodology

In the course of the study, general scientific research methods were used such as methods of deduction and induction, comparative analysis and synthesis, as well as method of scientific review of the source bases.

The main objective of the study was to assess the efficiency of financial support granted to social enterprises. This assessment was made on the basis of expenditure spent on establishing new or supporting existing social enterprises. Therefore, the main research question was: What impact on the state of public finances was caused by providing support to the surveyed enterprises?

The first phase of the research involved the examination of the concept of social enterprise and efficiency of the public support. The second phase included selection of social enterprises for research (the sample selection was

deliberate, not random). The next phase included the analysis of project documentation, financial documentation of the surveyed enterprises and determination of the economic situation of all employees employed in social enterprises (Figure 1).

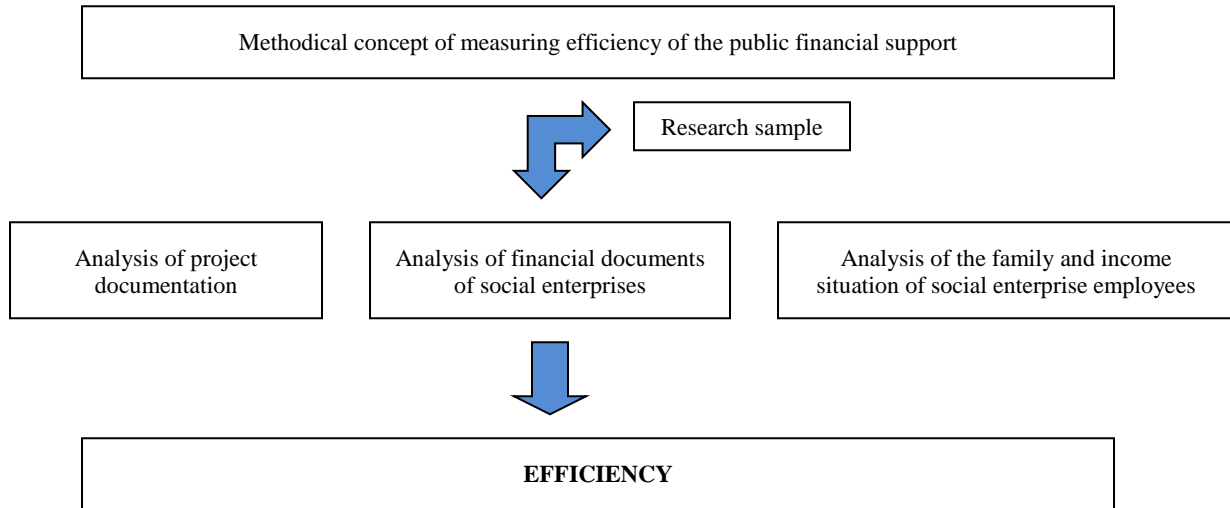


Fig. 1. The research model
Source: composed by author

The research covered social enterprises operating in Warmia and Mazury. It is a region located in the north-eastern part of Poland, whose characteristic feature is the high level of unemployment (in relation to the national average). It covers 7.7% of Poland (24,173.47 km²). According to the list published by Department of Social Economy and Public Benefit Ministry of Labor and Social Policy, in July 2019 there were 79 enterprises (<http://www.ekonomiaspoleczna.gov.pl/>). In the Olsztyn subregion (it includes the Bartoszycki, Kętrzyński, Lidzbarski, Mrągowski, Nidzicki, Olsztyn, Szczycieński poviats) and the city of Olsztyn (which is treated as a separate subregion - the capital of Warmia and Mazury), there were 22 entities that received support in 2017-2018 from the Social Economy Support Center in Olsztyn. The characteristics of these entities are presented in Table 2.

Table 2. Characteristics of the surveyed social enterprises

Nr	Legal form	Business description
1	association	Book publishing, newspaper and magazine publishing, newspaper printing, other printing, bookbinding and related services.
2	social cooperative	Sound system and comprehensive service of artistic events.
3	social cooperative	Motorcycle workshop and commission; occasional transport.
4	association	Running a restaurant, retail sale in non-specialized stores with a predominance of food and drink.
5	association	Artistic and cultural activities directed at supporting youth activity and combating social exclusion among youth.
6	social cooperative	Manufacture of ready meals and dishes; preparation and delivery of food for external recipients; other food service activities.
7	foundation	Propagating stress urinary incontinence treatment with innovative, minimally invasive methods, including by laser method.
8	foundation	Activities supporting insurance and pension funds
9	foundation	Emergency medical services; education and training; prevention of a healthy lifestyle.
10	social cooperative	Activities connected with the production of films, video recordings and television programs.
11	foundation	Production of radio and television programs as well as spots and advertising films; running regional internet television.
12	social cooperative	Preparation and delivery of food for external recipients; production of ready meals and dishes.

13	social cooperative	Activities of physiotherapists: physiotherapeutic diagnostics, physical therapy, hydrotherapy, therapeutic massage, exercise therapy, etc.; non-school forms of sport education as well as sport and recreational activities.
14	association	Windsurfing and kitesurfing school, organizing sports colonies for young people.
15	foundation	Maintenance and repair of motor vehicles, except motorcycles; non-specialized cleaning of buildings and industrial facilities.
16	foundation	Educational support activities, activities related to the performance of artistic performances, activities related to the production of films, video recordings and television programs, photographic services.
17	social cooperative	Activities related to the performance of artistic performances; catering.
18	foundation	Activities in the areas of broadly understood information technology; running an internet portal - an innovative land property classifieds site.
19	association	Furniture production, retail and wholesale of furniture.
20	social cooperative	The production of candles and other products complies with ecological standards.
21	association	Renting and leasing of recreational and sports equipment; non-school forms of sport education and sports and recreational activities; other sport-related activities.
22	social cooperative	Renting and leasing of recreational and sports equipment; repair of sports equipment; organization of sporting events.

Source: composed by author according to project documentation

As can be seen, the surveyed entities took three legal forms typical for social enterprises: a social cooperative, foundation and association. On the other hand, the types of economic activity were various. There was no clear dominance of any of the sectors.

Another problem is setting an upper limit for the efficiency of using public funds. Of course, the reimbursement for enterprises paid to the public sector could exceed the amount of support granted to them (this has happened in the case of one enterprise – see results section). In addition, the key period is the period of operation of enterprises after receiving support and the related time interval in which the efficiency of assistance is assessed. Therefore, the level of 50% efficiency calculated as the ratio of reimbursement to the level of support provided is an appropriate demarcation line between poor and good result. Statistics have also adopted this way of reasoning, in which the level of 0.5 (or 50%) is often a demarcation line that allows interpreting specific phenomena (patrz np. Aczel, 2008, p.441; Fernandes, 2009, p.127). Therefore, adopting the reasoning that a return of public funds invested in social enterprises in the amount of minimum 50% would be a beneficial phenomenon (Figure 2).

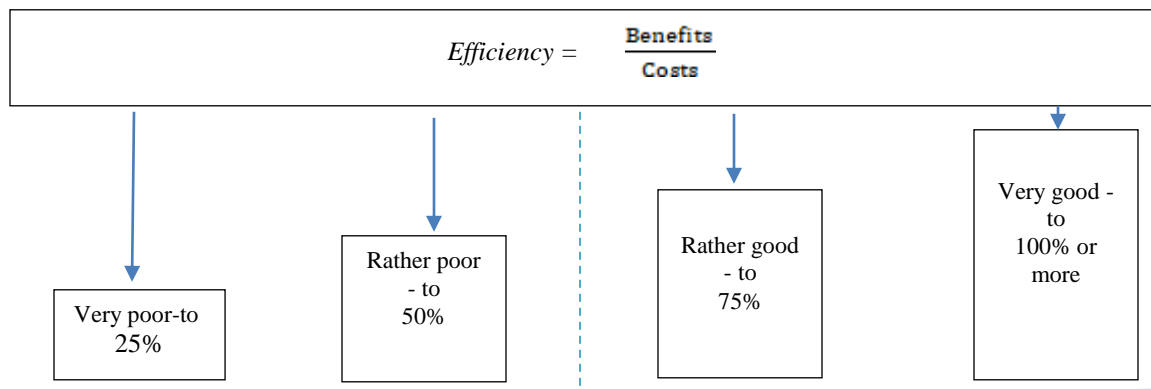


Fig. 2. Thresholds for assessing efficiency of the public financial support

Source: composed by author

It should be remembered that the social economy sector is being dealt with all its conditions. Therefore, the 50%-100% return on public funds invested is very beneficial, assuming the achievement of social goals, which are often difficult to express with economic effects (e.g. joy of a person who has a job, stability in the family, sense of meaning in life, etc.). In addition, commercial investors should be interested in returns exceeding 100% of the

capital invested and there would be no need for intervention in the form of public support. If it is necessary, it results from the specifics of social entrepreneurship and an attempt to activate socially excluded people.

Estimates presented in the results section and discussion are presented in the Polish currency - PLN (about 4.3 PLN = 1 EURO).

5. Results

The analyzed social enterprises received the total amount of PLN 3 538 077.00 under direct financial support. In the form of investment support (i.e. funds transferred, which had to be spent on investments in these enterprises), PLN 2 038 299.70 was transferred. In turn, basic operational support (so called “bridge financing” - it did not have to be of an investment nature) was PLN 920 033.24, while extended bridge financing (granted in specific cases) was PLN 579 744.06 (table 3). It can be seen that the main intention of the analyzed financial support was to stimulate investment in social enterprises, and thus to cause their qualitative development and sustainability (investment support constituted 58% of the total support provided to social enterprises).

Bridging financing, i.e. operational support, decreased over time (extended support was almost 40% smaller than basic support). It follows that the policy of supporting social enterprises was aimed at gradually gaining independence, so that in the future they could compete on classical terms (i.e. on market principles without financial support).

Table 3. Public support for social enterprise

Enterprises code	Date of starting business activity	Date of signing the support contract	Investment subsidy amount	Amount of bridging financing	Amount of extended bridging financing	Total support amount
1	23-12-2005	07-06-2018	119400.00	55139.97	37284.37	211824.34
2	30-12-2005	02-08-2018	48000.00	22040.75	14907.82	84948.57
3	10-03-2006	27-11-2017	120000.00	55372.19	37298.30	212670.49
4	24-04-2008	25-07-2017	48000.00	22144.38	14907.99	85052.37
5	11-05-2009	25-09-2017	120000.00	55378.63	37253.85	212632.48
6	18-09-2012	05-02-2018	24000.00	11010.85	5972.38	40983.23
7	12-12-2012	29-06-2017	120000.00	55142.35	37411.63	212553.98
8	05-11-2013	05-12-2017	120000.00	47992.46	37285.44	205277.90
9	04-02-2014	23-06-2017	120000.00	55142.35	37328.89	212471.24
10	19-02-2014	23-06-2017	96000.00	44113.88	29863.12	169977.00
11	04-03-2015	04-12-2017	95980.00	44104.99	29835.04	169920.03
12	24-06-2015	11-01-2018	24000.00	11027.37	7455.98	42483.35
13	12-11-2015	17-11-2017	110000.00	55140.80	34318.68	199459.48
14	10-04-2017	21-12-2017	120000.00	33078.29	11072.07	164150.36
15	05-09-2017	05-10-2017	120000.00	55130.48	37284.59	212415.07
16	28-09-2017	24-11-2017	105000.00	55372.19	37285.44	197657.63
17	22-11-2017	30-11-2017	72000.00	33226.70	22371.26	127597.96
18	11-12-2017	18-01-2018	96000.00	44109.47	10557.81	150667.28
19	29-12-2017	28-02-2018	96000.00	44092.93	17937.31	158030.24
20	23-01-2018	23-08-2018	48000.00	22054.10	14909.11	84963.21
21	27-03-2018	26-04-2018	119919.70	55110.63	37340.04	212370.37
22	28-06-2018	06-07-2018	96000.00	44107.48	29862.94	169970.42
Total	X	X	2038299.70	920033.24	579744.06	3538077.00

Source: composed by author according to project documentation and financial statements of social enterprises

The effects of the support provided are presented in Table 4. The supported enterprises generated a total of PLN 772 229.67 before granting the support and PLN 2 021 400.60 after receiving the support. No specific dates can be given here, as revenues before receiving support were set at the end of the year preceding the support (so it was 2016 or 2017 depending on the date of signing the contract, and hence the date of transferring funds). On the

other hand, revenues after receiving support were analyzed after a full year (i.e. 12 months) after receiving support (so it was in 2018 or 2019 - depending on the receipt of support). The penultimate column from Table 4 includes payments made to the public sector in the form of contributions to the Social Insurance Institution (pension system), as well as taxes and public levies (Value Added Tax - VAT, income tax paid from employed persons – i.e. Personal Income Tax - PIT or Corporate Income Tax - CIT).

Table 4. Effects of support received among the surveyed enterprises

Enterprises code	Total support amount	The company's revenues before the granting of funds	Revenue after receiving aid	Contributions to the public sector	Persons employed as a consequence of support
1	211824.34	0.00	5500.00	37475.00	5
2	84948.57	0.00	19542.00	10241.05	2
3	212670.49	0.00	149387.48	23617.09	5
4	85052.37	171034.17	444771.31	14402.05	2
5	212632.48	19395.00	107826.80	362152.50	5
6	40983.23	103396.66	248007.62	8648.47	1
7	212553.98	0.00	28090.32	20127.67	5
8	205277.90	76518.46	99675.42	19726.56	5
9	212471.24	67793.83	143328.29	25309.01	5
10	169977.00	51657.00	68996.50	20482.97	4
11	169920.03	273374.55	259841.22	19641.73	4
12	42483.35	9060	105825	4659.75	1
13	199459.48	0.00	5500	37954.53	5
14	164150.36	0.00	0.00	26308.26	5
15	212415.07	0.00	0.00	187462.24	5
16	197657.63	0.00	0.00	28739.09	5
17	127597.96	0.00	8856.00	15408.35	3
18	150667.28	0.00	25470.00	18348.16	4
19	158030.24	0.00	238732.93	18394.15	4
20	84963.21	0.00	12488.00	8556.25	2
21	212370.37	0.00	23731.71	31578.69	5
22	169970.42	0.00	25830.00	17005.01	4
Total	3538077.00	772229.67	2021400.60	956238.59	86

Source: composed by author according to project documentation and financial statements of social enterprises

Generally, one year after receiving support, the economic results of enterprises improved over 2.5 times (262%). However, determining the net effect requires taking into account the dynamic development of the Polish economy in recent years.

Therefore, the results obtained by enterprises No. 1-13 from Table 4 need to be corrected. These enterprises already existed before. So they would generate some income without getting support. On the other hand, enterprises No. 14-22 were created as a consequence of the possibility of obtaining support (the founders of these enterprises were recruited for the support program and expressed the opinion that without help they would not dare to become social entrepreneurs).

Therefore, the problem of correcting the obtained values should be solved for the first 13 companies. Most of them received support in 2017 (9 out of 13 entities, including 3 entities that signed the agreement in 2018 are they are not VAT payers). Therefore, the growth of the economy should be analyzed, or rather the growth of revenues of microenterprises (supported enterprises analyzed in this article belong to the category of microenterprises) in 2018 compared to 2017. According to the Central Statistical Office in 2018, enterprises employing up to 9 people obtained PLN 1 323.6 billion in total revenues (which means an increase of 17.9% year-on-year). At the same time, costs in 2018 in enterprises employing up to 9 people amounted to PLN 1 149.2 billion, i.e. 17.1% higher than a year ago (<https://stat.gov.pl>). Given the complexity of VAT, it is difficult to clearly determine what effect

of the increase in VAT paid was caused by these increases in revenues and costs. Approximately 1% effect can be assumed in the form of a slightly higher increase in revenues over costs. The analyzed enterprises paid a total of PLN 40 640.40 VAT. On the other hand, adjusting the net effect in question for the first 13 companies would change the estimates by approximately PLN 7 036.94 (this is 1% of the total amount of tax 703693.73 that these companies paid). So this is a low amount that will change the effect of paid VAT from just PLN 406 640.40 to PLN 399 603.46. With regard to corporate income tax, the situation is slightly different, as the Central Statistical Office of Poland stated that the financial result of non-financial enterprises employing up to 9 people amounted to PLN 174.5 billion in 2018 and was higher by 23.1% per year (<https://stat.gov.pl>). Income tax revenues of the 13 enterprises analyzed should therefore be reduced by 23.1% as an effect not caused by the support provided but by the development of the Polish economy. This is a large percentage, but the income tax paid by supported social enterprises was very low. In total, the analyzed enterprises paid PLN 35,188.00 in income tax (and 13 enterprises separated out only PLN 24 990.00). This is due to the low gross profit achieved by these enterprises and the construction of the tax system and the possibility of allocating the generated profit for statutory purposes (without paying tax). Therefore, taking into account the substantial percentage increase in profit among Polish microenterprises translates in the analyzed case only by a correction of PLN 5 772.69 (PLN 24 990.00 * 23.1%). You should not adjust income tax contributions from individuals (employees), as well as contributions to the pension system. They are high in Poland, but the employees employed as part of the support received were the long-term unemployed and/or disabled (formal support requirements), therefore finding a work on market conditions by them (i.e. without any support from this title for the employer) was unlikely.

To sum up, the financial effect for the national budget in the form of levies and taxes paid to the Treasury amounted to PLN 956 238.59, which is 27% of the total public funds allocated to supporting enterprises. Taking into account the aforementioned net effects (and thus the improvement of the financial results of Polish microenterprises in this period), this percentage would be slightly over 26%. Thus, according to Figure 2, these effects do not change the classification of the efficiency rating (rather poor). In addition, taking into account all the effects (beneficial and unfavorable to public finances), it should be added to the benefits that many people employed thanks to support did not have to pay benefits through social assistance centers (while they were unemployed for more than a year so unemployment benefit, which can be taken for a maximum of 1 year). Pursuant to the Act of 12 March 2004 on social assistance (Journal of Laws of 2019, item 1507), some people are entitled to a temporary or permanent benefit.

The amount of the temporary benefit depends on whether the person is a lonely person or not, while the permanent benefit is intended for disabled people. In addition, their income (or average family income) may not exceed a certain monthly level, e.g. for a single person - PLN 701, while for a family member - PLN 528. The algorithms for calculating the amount of benefit vary depending on the specific situation (i.e. income, being lonely or disabled - Table 5). However, after calculations, it can be stated that the state budget saved a total of PLN 191 544 by supporting the analyzed enterprises (in total, analysis of personal and material situation carried out among 86 persons indicated that 48 persons would be entitled to payment of benefits).

Table 5. Savings on unpaid benefits for employees in supported social enterprises

Criterion	Calculation method	Unpaid amount in PLN (benefit of the public finance sector)
Periodic benefit - a person in the family	$[(528 \text{ PLN} * \text{number of people in the family}) - \text{total income}] * 50\%$	51036
Periodic benefit - single person	$(\text{PLN } 701 - \text{income}) * 50\%$	19036
Permanent benefit - a person in the family	PLN 528 - average income per family member	96976
Permanent benefit - single person	701 PLN - income (but not more than 604 PLN)	24496
Total		191544 PLN

Source: composed by author according to the Act of 12 March 2004 on social assistance

Although this is not a direct payment to the state budget, it has allowed the public sector not to pay funds amounting to almost PLN 200 000. It should therefore be recognized on the financial benefit side of the public finance sector. In this case, after taking into account all variables (i.e. the net effect and the possibility of saving unpaid amounts from benefits), financial benefits for the public sector caused by the analyzed state intervention (granting support to social enterprises) in the amount of PLN 1 134 972.96 (according to calculation: PLN 956 238 can be attributed, due to corporate contributions minus PLN 7 036.94 due to the net effect of VAT and minus PLN 5 772.69 due to the net effect of income tax and plus PLN 191 544 due to public funds saved on allowances). In total, this gives 32.1% savings or a refund to the public sector. This result is therefore more favorable than 26% -27%, nevertheless it can be further assessed as rather poor, taking into account the interpretation presented in Figure 2.

6. Discussion

The analyzed enterprises were characterized by varied efficiency calculated according to the formula:

$$\text{Efficiency} = \frac{\text{Benefits}}{\text{Costs}} * 100\%$$

Where Benefits are measured by financial contributions to the public sector and Costs are measured by public expenditure related to financial support directed to social enterprises.

Among enterprises, there were units that significantly exceeded the 50% threshold in relation to the benefits they brought to the public sector in relation to the expenditures that the State budget incurred in the process of supporting them, but there were also those that did not exceed even 10% (including all those described in the results effects). See Table 6.

Table 6. Efficiency of the financial support in individual enterprises

Enterprises code	1	2	3	4	5	6	7	8	9	10	11
Efficiency (%)	17.69	12.06	11.11	16.93	170.32	21.10	9.47	9.61	11.91	12.05	11.56
Enterprises code	12	13	14	15	16	17	18	19	20	21	22
Efficiency (%)	10.97	19.03	16.03	88.25	14.54	12.08	12.18	11.64	10.07	14.87	10.00

Source: composed by author according to project documentation and financial statements of social enterprises

A desirable direction would therefore be to compare and thoroughly examine the differences between enterprises that achieved above-average results (and therefore very good from the point of view of the interpretation presented in Figure 2), and those that achieved very poor results. A thorough qualitative analysis of supported enterprises could perhaps outline some features that allow achieving above-average results regarding the effective use of support received (understood as above-average "repaying" to the public investor) and those features that interfere with the efficient use of public funds. The approach presented in this article regarding the efficiency of using public funds may arouse some controversy, however, it is difficult for it to refuse certain values of rationality. It should be remembered that the funds with which the analyzed enterprises were supported belong to the whole society. Therefore, if a decision was made to support enterprises from public funds, one should take care of their effective use and try to obtain a favorable return effect for the public finance sector, because in this way the common good is taken care of.

The period of assessing the effectiveness of public funds spent on the policy of supporting social entrepreneurship is debatable. In this type of purely commercial investment, the payback period lasts several years, and the assessment of the efficiency of the funds spent is also estimated at longer time intervals (e.g. several years).

The problem in the present case is, however, that several enterprises ceased to exist as soon as the project's lifetime ended, and even more entities went into "hibernation" (ie they generate no revenue). In addition, almost

all enterprises did not extend employment to those who worked as a result of receiving support. However, those who are still working (it is only 6 people) are still co-financed from public funds (e.g. The State Fund for Rehabilitation of Disabled People). In this case, the shortening of the assessment period for the efficiency of public aid is the most justified. This problem has a broadly described theoretical background, because four main types of social enterprises have been identified in Europe - the characteristics of which are described in Table 7.

Table 7. Types of the social enterprises

Lp.	Type of the social enterprise	Characteristics
1.	Social enterprises providing temporary employment through short-term subsidies	The assumption of this model is to create for a given group of people opportunities to gain professional experience (through temporary employment or to provide practical training in the workplace), with a view to the future integration of employees in the open market. Examples of such entities are Belgian workplace training organizations and Portuguese integration companies. In Polish conditions, social integration centers and clubs as well as professional activity centers play such a role.
2.	Social enterprises creating self-financing target jobs	Enterprises using this integration model seek to create jobs that are stable and economically sustainable in the medium term. In the first stage, public subsidies are awarded to make up for the difference in target group productivity. These subsidies are usually temporary and are phased out once the entity is able to compete in the open labor market. After the subsidization stage, these enterprises must provide integrated employees with remuneration from their own (mainly market) resources. Examples are German and social companies and British local enterprises. In Poland, this role can be played by social cooperatives, labor cooperatives, not-for-profit companies, non-governmental organizations conducting business activity.
3.	Social enterprises based on permanently subsidized employee integration	Enterprises using this model direct their activities to disadvantaged groups for whom integration in the open labor market is difficult in the medium term. Therefore, permanent subsidies are created by public institutions, stable jobs and certain types of enterprises protected against the open labor market. Such companies employ people with disabilities, mental retardation and mental illness. Examples of this type of entity are Portuguese, Swedish, Irish sheltered workshops and Belgian professional adaptation enterprises. In Poland - occupational therapy workshops and sheltered workshops.
4.	Social enterprises based on socialization through productive activity	The goal of this group of enterprises is not professional integration on the labor market, but rather the social rehabilitation and socialization of target groups through work focused on establishing and maintaining social contacts, learning to respect the rules, leading a more structured lifestyle, etc. Enterprises of this type direct their activities to people leaving addictions, people with significant physical or mental disability. Examples of such entities are the French professional adaptation centers and Belgian sheltered employment centers. In Poland, these are social integration clubs or community self-help homes

Source: composed by author according to Davister, Defourny, Gregoire, 2008, p. 253–278 and A. Pacut 2010, p.47–48.

Therefore, the problem of the national support policy is the fact that almost all the analyzed enterprises were of the first type (Table 7). On the other hand, the declared goals of the policy of supporting the social enterprise sector in Poland (declared even in program documents and draft guidelines) is the creation of the second type of enterprises, characterized in Table 7.

7. Conclusion

The paper presents an attempt at a "commercial" view on issues related to supporting social entrepreneurship. This approach may seem a bit surprising to many theoreticians dealing with the functioning of social enterprises. Nevertheless, it should be remembered that in the terms 'social economy', 'social enterprise' or 'social entrepreneurship', the word 'social' is only an adjective narrowing the field of scientific exploration. Social enterprises do not cease to be an enterprise with all its consequences, expressed in the need to compete in the market, struggle for limited resources and, above all, to acquire customers on more or less market terms. Therefore, although it should not be adopted in relation to the specific sector of social enterprises with 100% rules, measures and assessments of the classical sector of commercial enterprises, any monitoring and evaluation

of their functioning should not be stopped. This may be expressed in the fact of adopting slightly modified values (e.g. satisfactory return of public funds amounting to less than 100%), however, any measurement of effects and assessment of the efficiency of using public financial support should not be abandoned. Therefore, the result of the efficiency of spent funds at the level of 26% -31% (depending on whether or not specific effects are taken into account) can be considered as a poor, but not very poor. On the other hand, an improvement of this result by several percentage points would justify the awarding of a good grade in terms of the efficiency of using the received financial resources from public funds. The key to improving results is the sustainability of enterprises and created jobs. If it went beyond the minimum project requirements, and so if it were possible to move from the model of providing temporary employment through short-term subsidies to the model of creating self-financing, target jobs, this assessment would certainly be more favorable.

While I believe my findings and recommendations are important not only for the Polish sector of the social enterprises, I acknowledge the study's limitations. Mainly, the research sample was limited to just 22 units, which makes it difficult to generalize the conclusions. Therefore, this article should be treated as a proposal to undertake extensive research, even of an international nature. The difficulty here is the functioning of different legal regulations and different tax systems, however, after overcoming these problems, original research results could be obtained. In Poland, the lack of officially available data is a serious difficulty. While it is possible to check the amount of support received by specific entities, determining the effects of this support requires a lot of effort. This situation should be changed along the lines of other countries, especially since we are talking about effective control of the efficiency of spending public funds.

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Marian OLIŃSKI is the Professor of Institute of Management and Quality, Faculty of Economics, University of Warmia and Mazury in Olsztyn. An expert and head of research teams implementing scientific projects financed by the Ministry of Science and Higher Education and the European Union. A member of Polish and foreign scientific associations. Business adviser in the field of social entrepreneurship. Research interests: social entrepreneurship, activity of non-governmental organizations, business model concept.

ORCID ID: orcid.org/0000-0002-1707-0553

Register for an ORCID ID:

<https://orcid.org/register>

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DIGITAL SUPPORT TO EXTERNAL SUSTAINABILITY COMMUNICATION IN SELF-ADHESIVE LABELLING INDUSTRY*

Mariana Tesařová¹, Aleš Krmela², Iveta Šimberová³

^{1,2,3} Brno University of Technology, Kolejní 2906/4 612 00 Brno, Czech Republic

E-mails: ¹mariana.tesarova@vut.cz; ²ales.krmela@vut.cz; ³simberova@fbm.vutbr.cz

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Abstract. The article presents results of empirical research conducted on companies in Europe in the field of paper production and processing, specifically in the field of production of self-adhesive laminate that is used for self-adhesive labels. The article is focused both on companies that either produce (category 1), or process (category 2) paper. The main goal was to understand, describe and compare content and extent of the digitally supported external communication, with a focus on the communication of sustainable development goals, supporting a transition to business models for sustainability. The article's objective is to present some of the findings from this research to provide an overview of a degree of online external communication supported by digitalization and characteristics of the industry within the scope of sustainability and transition to business models for sustainability. External communication is focused on companies' websites, GRI reports, annual corporate sustainability reports and participation in the Communication on Progress composed by the United Nations. The original research design combines relevant theory and content analysis to answer the later mentioned research questions. To conclude, digitally supported communication in the paper industry is intense in category 1, while category 2 seems to be less active in terms of both the intensity and the content. The article presents the theoretical background of the research, research design and methods, results, and conclusions presenting insights concerning the industry as well as the respective theory, introduced together with limitations and areas for future research.

Keywords: sustainability; communication; online communication; external communication; digitalization; business model; sustainable development goals

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JEL Classifications: M14, M37, Q23

1. Introduction

Sustainability has become a buzzword in the 21st century (Ki & Shin, 2015). In the meantime, a strong trend and efforts of businesses towards an extension of the business models and creation of business models for sustainable development (Boons & Laasch, 2019) or business models focusing on sustainability targets (Raith & Seibold, 2018) can be observed across continents, countries, industries. Sustainability seems to have become a new paradigm when it comes to doing legal business. Moreover, sustainability can be also determined by smart, skillful, management is a vital precondition of successful development of financially healthy businesses (Tvaronavičienė, 2018). A lot of new companies, being focused on contribution to the solution of societal or environmental issues, thus creating value for the society, have been founded. At the same time, incumbent companies, particularly in a field of business-to-business (B2B), spent effort in order to implement specific actions that contribute to the reduction or even elimination of non-sustainability resulting from their core activities. The source of pressure to do so can be manifold, coming either from the external environment and companies' external stakeholders, like governments, municipalities, authorities or from internal stakeholders, like shareholders, management or employees.

Sustainability has been defined as triple-bottom-line (Elkington, 1998), a three dimensional concept, incorporating social, environmental and economic performance (Elkington, 1998; Reilly & Hynan, 2014), ideally all three dimensions being well balanced, thus forming a holistic concept and requiring a holistic and systemic approach, in business life ideally reflected in a corresponding business model for sustainability. True sustainability of such business models lies in the intersection, only such business is considered truly sustainable, which incorporates all three aspects (Schaltegger et al., 2016; Evans et al., 2017). Furthermore, sustainability represents the normative ethical principle enabling further development of society (Tvaronavičienė, 2012).

Guided by the United Nations, 193 member states agreed on a global scale on the agenda of promotion of a more sustainable future, whereas sustainable development goals (SDGs) address the global economic, social and environmental challenges that the whole society is facing, to leave no-one behind by 2030. Therefore, SDGs are suitable for research of sustainability in any industry as businesses play a significant role in achieving these goals (The United Nations, 2019). Not only governments are the responsible agent in the process of building sustainable societies. Nowadays, it is generally understood that corporate actors and the private sector are crucial in the process of the creation of green growth outcomes as well as sustainable development. This new paradigm is now internationally recognized and anchored in international policy through SDGs (GRI, 2019). Not only the company needs to perform sustainable activities, but it is also vital to choose a proper way how to communicate its efforts towards the outside environment.

Due to the rapid pace of technological improvements, the need for accelerated adaptation is arising. The most innovative companies were able to recognize early how digitalization and new digital tools affect their business models. And furtherly, what value they can extract from the information generated by their activity (OECD, 2017; Castelo-Branco et al., 2019; Prodani et al., 2019; Petrenko et al., 2019). That is also the reason why more and more companies nowadays communicate through online channels as they understand the importance of digitalization. External communication, in particular, has proven to be vital for organizations in terms of stakeholders' relationship-building, more specifically in organizations' efforts to involve the larger community of stakeholders, and consequently build social legitimacy on both internal and external level (Ravazzani, 2016).

Although this topic is really important, it has not received sufficient attention, especially in connection with the paper industry. Recent research on external communication has focused mainly on contemporary online contexts, more specifically on corporate websites (e.g. Pasztor, 2016; Point & Singh, 2003; Maier & Ravazzani, 2018), however, this article goes beyond corporate websites and also investigates communication through other digitally-enabled tools being freely accessible online for external audience. External communication about the sustainability activities of firms may vary significantly across different companies reflecting different communication channels, content, and frequency. All these aspects may reflect the company's priorities within resource allocation, its culture and also leadership in the sustainability domain (Reilly & Naznin, 2018). In this article, we have chosen companies in the paper industry that are active in the field of paper production and processing, specifically in the field of production of self-adhesive laminate that is used for the production of self-adhesive labels. Within the scope of these companies, we focus on their digitally supported online external communication about sustainability on their websites, in annual sustainability reports, and their participation in Communication on Progress by UN and external rankings - the Global Reporting Initiative.

2. Sustainability in a self-adhesive labelling industry

Although we understand sustainability as a triple-bottom-line concept (Elkington, 1998), it might be, particularly by some practitioners or the wide public, narrowed down into its environmental dimension only. Environmental sustainability is of a vital focus of manufacturing companies (Chierici & Copani, 2016), but not the only one. In the paper industry, the main raw material for paper production is wooden fibres, either virgin or recycled. According to the Monitoring Report 2017 of the European Paper Recycling Council, the recycling rate of all used paper in Europe has reached 72,3 % in 2017, or 59,6 million tons, out of a total of 82,4 million tons of all paper consumed in the same period (European Paper Recycling Council, 2017). According to the same study, Europe has outperformed compared to the total world with the recycling rate being 58,4 %. (ibid)

Our study focuses on a selected segment of the European paper industry, being the European market for a paper-based siliconized release liner. According to the authors' best knowledge, as well as based on fragmented self-adhesive labeling industry statistics obtained from industry insiders, expert companies or industry associations, the paper-based siliconized release liner market amounted in total approx. 12 bill m2 per year in 2017, and specifically a segment of paper-based self-adhesive laminate for labeling is estimated to be approx. 6,4 bill. M2 per year. Using a weight conversion factor of 80 g / m2, the total paper-based release liner volume corresponds to approx. 960.000 of tons. The volume of self-adhesive laminate for labeling segment itself, using a conversion factor 140 g / m2 (since two layers of paper – release liner and face stock - as well as adhesive are involved), corresponds to approx. 896.000 tons. Some 40 % of the volume in a self-adhesive laminate for labeling, i.e. approx. 358.000 tons of the siliconized paper substrate – release liner - ends up after application of label to the product as a by-product resp. waste (being so-called spent liner). Following the principles of a circular economy-related waste pyramid, simplified into 4R framework of main focus areas, reducing, reuse, recycle, recover (Potting et al., 2016; Kirchherr et al., 2017), the industry takes efforts toward adhering to the waste reduction principles. For the time being, yet with partial success, what might be perceived as problematic when it comes to environmental sustainability. Precise and reliable data on what percentage of the spent liner falls into each of the 4R categories are not available. The reduction is reflected in regular efforts towards making the release liner lighter in weight. Reuse is technically currently not practicable in the field of the release liner. On the contrary, recycling and recovery are frequently applied ways of reprocessing the spent liner.

In this article, we focus specifically on the market of the self-adhesive labels, since the seemingly uneasily to recycle spent liner gains more and more attention of various stakeholders, thus being potentially considered as problematic when it comes to sustainability, esp. its environmental aspect. Although its share on the total European paper waste generated is comparably small, it is relevant to focus on it for numerous reasons. One is the fact that the self-adhesive labeling industry grows, thus generating more of the spent liner. AWA and FINAT

estimate a CAGR of 4 – 5 % over the last couple of years and assume a similar growth also for the years to come. Second, since involved companies have invested and continue to invest large amounts of money into producing and converting technologies and expect corresponding returns on investments over a longer period. Third, self-adhesive technology has proven itself to be a versatile, easy to use and thus popular one. It has gained momentum over competing technologies, esp. so-called wet glue labels, so typical in the beverage industry (esp. labeling of the returnable beer bottles). Last but not least, the industry employs Europe-wide substantial amount of people. Therefore, the sustainability of the entire industry stands in the focus of the attention of various stakeholders.

The paper producing and processing industry is relatively diversified and fragmented. Although the paper production process in its frame design, being the processing of the wooden fibres, remains the same for over centuries, the single paper grades, their specifics, as well as the end uses are numerous. Paper has been invented in ancient China even centuries b. C. as a novel medium for recording and keeping written information. That time perhaps as a cheaper and more practical solution than other available has over the time developed to a highly complex and technological process and product, involving huge investment, high-speed producing equipment, special skills handed over from one generation to the next, secret recipes known to only a small circle of insiders. The paper industry has got in the recent decades under significant pressure of the society, partly deservedly, partly as a victim of targeted false propaganda and numerous misunderstandings or misinterpretations. No doubt, several raw materials - called pulp - producers have harvested forests and trees unsustainably, following only economic profits, not considering the environmental aspects at all. A Brazilian rain-forest being a typical example of it. However, particularly in the last couple of decades, a clear trend towards sustainable forestry and sustainable sourcing is an industry dominant one. A number of measures have been taken, standards and certifications have been introduced. Particularly FSC® (forest stewardship council) and PEFC™ (the program for the endorsement of forest certification) are in the meantime widely accepted and requested standards, when it comes to sustainable production and sourcing of fibre-based products. Numerous other activities, both in terms of environmental as well as social engagement are conducted and promoted or conducted but not promoted, or only promoted, but not fully conducted. A window dressing might still exist, especially under the impression, that being environmentally or socially sustainable leads to a positive image, which directly or indirectly leads to increasing company value, attract new customers, employees, shareholders. Thus, it is believed that a good performance in environmental and social fields goes hand in hand with good economic results.

An important aspect is the communication of the sustainability-related efforts and results, thus reaching out to the relevant stakeholders, making them aware of the sustainability-related performance. Most typical communication means is annual sustainability reports, published both in paper and online versions. Especially in the digital age, digitally-enabled tools are present, thus businesses can make much wider, faster, more efficient use of the online channels. Numerous companies, therefore, devote a significant part of their external communication to the aspects of sustainability. The way paper making and paper converting companies communicate about their sustainability efforts, with focus on online channels, have therefore been a core focus of our research.

The Sustainable Development Goals (SDGs)

Not only governments but also corporate actors and the private sector are vital in creating sustainable societies, green growth outcomes, and sustainable development. This new paradigm is internationally recognized and communicated through SDGs (GRI, 2019). SDGs consist of 17 goals that are composed of 169 targets in total (UPM, 2019), SDGs aim to achieve a better and sustainable future for all, while addressing global challenges, such as poverty, inequality, climate change, environmental degradation, peace, and justice. All 17 goals are interconnected. These goals represent a call for action by all countries and encourage them to promote prosperity while protecting the planet. Ending poverty must go hand-in-hand with strategies that build economic growth while at the same time addressing a range of social needs, such as education, health, social protection, and job opportunities, together with the focus on climate change and environmental protection (The United Nations Global Compact, 2019).

17 SDGs:

1. No Poverty
2. Zero Hunger
3. Good Health and Well-Being
4. Quality Education
5. Gender Equality
6. Clean Water and Sanitation
7. Affordable and Clean Energy
8. Decent Work and Economic Growth
9. Industry, Innovation, and Infrastructure
10. Reduced Inequalities
11. Sustainable Cities and Communities
12. Responsible Consumption and Production
13. Climate Action
14. Life Below Water
15. Life on Land
16. Peace, Justice and Strong Institutions
17. Partnerships for The Goals (The United Nations, 2019)

Global Reporting Initiative (GRI)

90-95% of the world's largest companies produce sustainability reports (Ernst and Young, 2014; King et al., 2015; Landrum & Ohsowski, 2018). However, not all companies perceive reporting as a tool bringing them specific value and, therefore, not all companies choose to produce and submit sustainability reports (Stubbs et al., 2013). According to several researches, the GRI is perceived as the most commonly used format in terms of sustainability reporting (Calace, 2016; Ernst and Young, 2016, Landrum & Ohsowski, 2018). In the GRI, participants are required to report on economic indicators, environmental compliance, labor practices, human rights, society, and product responsibility, thus the GRI framework provides standardization through these requirements. At the same time, the GRI framework allows each company the flexibility in reporting within these categories and subcategories (Landrum & Ohsowski, 2018). Companies have a chance to report on the most crucial issues for the company and its stakeholders. Reports are maintained in a database that is publicly accessible and, according to the official website, the database contains over 23,000 GRI Reports recorded in the database whereas number continues to grow (GRI, 2019). GRI works in alignment with the UN Sustainable Development Goals (SDGs) and aims to foster inclusive development and sustainable, green, economic growth through the empowerment of decision-makers through their sustainability standards and multi-stakeholder network (GRI, 2019).

The Communication on Progress (CoP)

For companies committed to sustainability, it is vital to report to their stakeholders in a transparent and public manner. Annual Communication on Progress (CoP) represents a key component of the company's commitment to the UN Global Compact and UN SDGs. (The United Nations Global Compact, 2019). Submitting an annual CoP provides valuable information to the company's stakeholders and represents a meaningful way of how to communicate a company's sustainability efforts and actions. CoPs also works in the alignment with UN SDGs, thus enabling companies to communicate their activities towards specific SDGs as well. CoP collaborates with other frameworks, such as the GRI, to ensure alignment of standards and that meeting the requirements of one framework supports compliance with the others (The United Nations Global Compact, 2019).

Drawing from the theoretical background, the following research questions were formulated:

- [1] To what extent companies externally communicate information about their activities towards sustainability?
- [2] Which SDGs are the most common within the communication strategy of the sample of companies?

3. Methodology and research design

The presented research is based on the stated theoretical review of literature that sets the background for further research and presupposes chosen online external communication tools used by companies to address their activities towards sustainability. Furtherly, content analysis of chosen online communication tools, such as companies' websites, corporate sustainability reports, GRI reports and The Communication on Progress is used to examine the extent to which each company externally communicate their sustainability activities. Moreover, the fulfillment of SDGs goals is analyzed through content analysis as well, to position each company report within stages of corporate sustainability.

3.1 Content Analysis

Content analysis is characterized as a type of textual analysis studying the messages or characteristics of a text to interpret meaning. Content analysis methodology has been used by several authors to study corporate sustainability and corporate social responsibility (CSR) reports (Bondy et al., 2008; Campopiano & de Massis, 2015; Dobbs & van Staden, 2016; Lock & Seele, 2016; Manetti & Toccafondi, 2014; Vurro & Perrini, 2011; Landrum & Ohsowski, 2018). Using UN SDGs as content categories, this study identified these 17 goals that were analyzed in terms of achievement of these goals by each company based on online external communication information drawn from companies' websites, Annual Sustainability Reports, GRI reports, and CoP participation.

Collected data were compared in order to identify whether they support each other in companies' external communication towards sustainability. Table 1 and Table 2 represent external communication tools used by companies in order to communicate sustainability: the company's website, corporate sustainability reports, GRI reports, CoP participation. They also provide information about the origin of the company. Table 3 and Table 4 represent specific SDG goals and identify which goals are achieved by the companies based on the data from their external communication tools identified in Table 1 and Table 2. Content analysis is made separately for both categories (category 1 and category 2) within the European paper industry.

The Sustainable Development Goals (SDGs) defined by the United Nations are used as a visualization tool that is sufficiently complex, analytical, flexible and general in terms of sustainability (The United Nations, 2019). Guided by the United Nations, 193 member states agreed on a global scale on the agenda of promotion of a more sustainable future, whereas SDGs address the global economic, social and environmental challenges that we are all facing, intending to leave no-one behind by 2030. Therefore, SDGs are suitable for research of sustainability in any industry as businesses play a significant role in achieving the goals (UPM, 2019).

Another criterion is companies' willingness to participate in the Communication on Progress (CoP), more specifically in the section focused on 17 Sustainable Development Goals. CoPs are publicly available on the website of the UN Global Compact and submitted directly by the participants, thus enabling companies to communicate their efforts to support and uphold the Ten Principles of the UN Global Compact. For this article, the focus is put on CoPs' section of 17 Sustainable Development Goals where companies have an opportunity to communicate their efforts in achieving these goals (The United Nations Global Compact, 2019).

3.2 Relevant market and sample selection

The research subject is companies that are active in the field of paper production and processing, specifically in the field of production of self-adhesive laminate that is used for self-adhesive labels manufacturing. We focus both on companies that either produce (category 1), or process (category 2) paper. Category 2 alternatively processes also another type of material for self-adhesive laminate. The market is currently clearly dominated by

paper with over 80 % of the substrate (release liner) being paper. In a typical supply chain, the producers from category 2 are customers of these belonging to category 1.

The paper producers, being called category 1, are generally large, specialty papermaking companies. The category 1 produces, next to numerous other paper grades, also a specific paper grade called substrate, namely release base paper (RBP), either highly super calendared kraft – being also called glassine and/or SCK, or other types of paper-based substrates like polyethylene-coated kraft and clay-coated kraft. Our research focuses on the RBP, which is used for surface treatment with silicone and lamination with other types of paper, called face stock. However, there are various types of substrates for self-adhesive labeling, whereas some of them are a plastic film-based (typically PT, PET), or are a certain type of laminate themselves (like PE coated kraft paper). According to authors' best knowledge, as well as based on self-adhesive labelling industry statistics available from industry insiders, expert companies or associations (e.g. Alexander Watson Associates, called AWA, or FINAT), there are 5 main players in Europe producing the super-calendared kraft-based substrates: United Paper Mills (UPM), Ahlstrom-Munksjö, Delfort, Sappi and Ermolli. These 5 producers (with partially multiple manufacturing locations) cover nearly 100 % of the European demand for the super calendared kraft paper-based substrate for the self-adhesive labeling applications.

Category 2 comprises substrate converting companies, in fact, customers of category 1. They are called in-house siliconizers (producing self-adhesive laminate for labeling, called label stock) and commercial siliconizers (producing siliconized release liner, used for further lamination for label stock or other self-adhesive applications). The main producers in category 2 are Avery Dennison, UPM – Raflatac, Herma, Fedrigoni Group, Ritrama, Lecta Group, Scandstick, Advanced Materials Coating / Intercoat, Mondi, Loparex, Itasa, who would cover the significant majority of the European self-adhesive laminate for labeling market.

The sample selection in both categories is therefore representative for the subject market segment, however not exhaustive particularly in category 2, since several other, small to medium size companies do exist and operate in the subject industry. They are, however, either comparably small in size, or only to a limited extent focused on particularly self-adhesive labeling. We did not include them in the study for multiple reasons. Namely them being the individual size and the market share of the company vs. the main players mentioned above, as well as for the fact that majority of the smaller players either publish very sporadically, if at all, any information that could be used in a comparative analysis, as we did run it with the larger players.

The companies in our sample were identified drawing on authors' knowledge of the subject market, as well as using release liner and self-adhesive labeling related expert information and databases, available from industry insiders or through reports that were obtained by the researchers - particularly reports available from industry-related association and companies like Alexander Watson Associates as well as FINAT, and triaged based on the following criteria:

- based in Europe with headquarters (at least regional headquarters) and manufacturing facilities, typically multiple sites, thus being actively involved in production and supply to the European self-adhesive labeling market. An exception in our sample is Avery Dennison (category 2), which is headquartered in the USA, however having a strong European organizational and manufacturing base and being a very strong player on the European market.
- the size of the company is medium to large, typically over 100 employees
- must belong into Forest and paper products category, specifically in the field of paper production and processing in the self-adhesive labeling market

The sampling technique applied can be characterized as purposive sampling, combining critical and typical case sampling (Saunders et al., 2016), since the selected companies represent a large part of the relevant market and as such can be called trendsetters for the industry.

4. Research results

The following chapter presents the results of research focused on online external communication towards sustainability within companies of category 1 and 2 in the field of production of self-adhesive laminate that is used for self-adhesive label production. The research questions have been organized logically, thus the answer to one question supports the answering of the following question. The results provide an overview of the industry's online external communication towards sustainability and characteristics in terms of specific areas of sustainability.

4.1. To which extent companies externally communicate information about their activities towards sustainability?

To answer this question, Table 1 and Table 2 were drawn to analyse which online external communication tools are used by European companies that belong into category 1 and 2 and are active in the field of paper production and processing within paper industry for self-adhesive labelling.

Table 1. Online external communication tools used by category 1

Category 1: Paper producers							
Reference number	Company name	Country	GRI index	Website	Reports available on websites	CoP participation	Total
1	Delfort	Austria	x	X	x		3
2	UPM Kymmene	Finland	x	X	x	x	4
3	Ahlstrom-Munksjo	Finland	x	X	x	x	4
4	Sappi	Belgium	x	X	x	x	4
5	Ermolli	Italy		X			1
Total			4	5	4	3	

Source: Authors' own research

According to the results, paper producers (category 1) use their companies' websites, Annual Sustainability Reports, GRI and also participate in CoP to externally communicate their activities towards sustainability. The only exception is Italian paper producer Ermolli who relies solely on its website and communicated information regarding sustainability is sporadic (Ermolli, 2019). On the other hand, Delfort, UPM Kymmene, Ahlstrom-Munksjo and Sappi communicate their sustainability efforts to large extent with documents, reports, and websites being very complex, well-arranged, informative and thoughtful (GRI, 2019; The United Nations Global Compact, 2018; Delfort, 2019; Sappi, 2018; UPM, 2019; Ahlstrom-Munksjo, 2018). Therefore, these companies can provide their on-line visitors and stakeholders with valuable information about their sustainability efforts and performance. Delfort does not participate in the Communication on Progress (CoP), however, based on their other external communication tools, the company delivers more than a sufficient amount of information about their sustainability activities (Delfort, 2019). Overall, category 1 companies possess a strong base of digitally enabled well-structured external communication tools that are displayed online and are available for anyone interested in their sustainability efforts and plans. Therefore, we conclude that companies belonging to category 1 are using external communication tools to provide information about sustainability to a great extent.

Table 2. Online external communication tools used by category 2

Category 2: Downstream users, customers of the substrate producers							
Reference number	Company name	Country	GRI index	Website	Reports available on websites	CoP participation	Total
6	UPM Raflatac	Finland		x	x		2
7	Herma	Germany		x			1
8	Fedrigoni Group	Italy		x	x		2
9	Ritrama	Italy		x			1
10	Scandstick	Sweden		x			1
11	Lecta Group	Spain		x	x	x	3
12	Avery Dennison	USA / The Netherlands	x	x	x		3
13	AMC / Intercoat	Germany		x			1
14	Mondi	Austria	x	x	x	x	4
15	Loparex	USA / The Netherlands		x	x		2
16	Itasa	Spain		x	x		2
Total			2	11	7	2	

Source: Authors' own research

On the other hand, based on the results, a number of category 2 companies generally lack behind to provide sufficient information and externally communicate their sustainability activities. Only one out of thirteen companies covering the European market of category 2 externally communicate their sustainability activities through all chosen communication tools. Mondi uses all four channels (Mondi, 2019). Right behind Mondi is Lecta Group, using sufficiently all chosen communication tools besides GRI (Lecta, 2019). Avery Dennison uses three tools as well, to communicate their sustainability efforts: website, company's reports (even though the structure is a bit different, they are very comprehensive and well-structured) and GRI. They also won Innovations in Sustainability Award for their work with EcoVadis (EcoVadis, 2019). UPM Raflatac, Loparex, and Fedrigoni rely solely on their websites and Annual Sustainability Reports (UPM Raflatac, 2019; Loparex, 2019; Fedrigoni, 2019). Itasa uses these two tools as well, however, information is outdated (last report from 2016) and report is not available in English language (Itasa, 2016), although they do have basic information about sustainability activities on their website in English available (Itasa, 2019). Other analyzed companies only use websites for their external communication about sustainability. However, the information provided is not sufficient enough. Scandstick and AMC mention sustainability very marginally, general information regarding sustainability comprises of a very few sentences. Thus, companies of category 2 externally communicate information about their sustainability activities with the help of digitally enabled tools only to a small extent.

4.2 Which SDGs are the most common within communication strategy of the sample of companies?

Similarly, to answer which SDGs are the most common ones, Table 3 and Table 4 were conducted to analyze which of the 17 SDGs are met by companies in categories 1 and 2. Consequently, Table 3 and Table 4 examine which of these goals are externally communicated through their online external communication tools, more specifically their websites, Annual Sustainability Reports, GRI index and participation in CoP.

Table 3. Paper producers' compliance with Sustainable Development Goals

Category 1: Paper producers																			
Reference number	Company name	SDGs																	Total
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
1	Delfort			x		x	x	x	x	x	x		x	x		x			10
2	UPM Kymmene			x	x	x	x		x	x			x	x		x	x	x	11
3	Ahlstrom-Munksjo			x		x	x	x	x	x			x		x	x	x	x	11
4	Sappi	x		x	x		x	x	x	x			x	x		x	x	x	12
5	Ermolli						x	x					x						3
	Total	1	0	4	2	3	5	4	4	4	1	0	5	3	1	4	3	3	

Source: Authors' own research

Delfort has a very strong and wide base with a focus on several sustainability aspects and goals. They do not refer directly to SDGs, however, external communication of their activities regarding different sustainability goals shows that they comply with 10 out of 17 SDGs in total. Some goals are communicated more in-depth, such as effective water consumption and life on land, some of them with less intensity, such as gender equality and reduction of inequalities (Delfort, 2019).

UPM talks on their website about responsibility, rather than sustainability, and their goals are directly linked to SDGs, with focus on 11 SDGs, as communicated through their digitally-enabled communication tools (Lundgren, 2019). Ahlstrom-Munksjo also seeks to advance the UN SDGs across their value chain by aligning nine material topics with the UN SDG framework to contribute or reduce a negative impact on a minimum of 11 SDGs across their value chain (Ahlstrom-Munksjo, 2018). Sappi also works in alignment with SDGs and they work to integrate the principles and aspirations of the UN SDGs into their everyday business activities, covering 12 SDGs (Sappi, 2018). Ermolli only covers 3 SDGs without any reference to the SDGs framework itself (Ermolli, 2019).

The most common SDGs that all companies of category 1 target and communicate are Clean Water and Sanitation (6) and Responsible Consumption and Production (12). Other goals of high priority are communicated by four companies that report to a great extent their sustainability activities.

These goals are Good Health and Well-Being (3), Decent Work and Economic Growth (8), Industry, Innovation and Infrastructure (9) and Life on Land (15). Affordable and Clean Energy (7) is also in the viewfinder of four companies. Other common goals communicated by three companies are Gender Equality (5), Climate Action (13) and Partnerships for the Goals (17). Less overall attention is drawn to No Poverty (1), Quality Education (4), Reduced Inequalities (10) and Life Below Water (14). SDGs of Zero Hunger (2) and Sustainable Cities and Communities (11) are not communicated by any company of category 1.

Table 4. Downstream users' compliance with Sustainable Development Goals

Category 2: Downstream users, customers of the substrate producers																			
Reference number	Company name	SDGs																	Total
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
6	UPM Raflatac						x	x	x				x	x		x			6
7	Herma								x	x			x			x			4
8	Fedrigoni Group			x	x		x					x	x	x					6
9	Ritrama			x		x		x			x		x			x			6
10	-																		0
11	Lecta Group												x	x	x	x		x	5
12	Avery Dennison		x	x	x	x	x	x	x		x	x	x					x	11
13	AMC Intercoat /												x					x	2
14	Mondi	x	x	x	x	x	x	x	x	x		x	x	x	x	x		x	15
15	Loparex			x		x					x		x						4
16	Itasa								x							x		x	3
	Total	1	2	5	3	4	4	4	5	2	3	3	9	4	2	6	0	5	

Source: Authors' own research

Based on the results, category 2 varies in terms of communication regarding the fulfillment of UN SDGs. Company Scandstick was excluded from further research on SDGs as it did not provide sufficient information regarding sustainability through its external communication tools. On the other hand, UPM Raflatac is highly committed to UN SDGs aiming towards a stronger sustainability culture, improved employee engagement and increased transparency (UPM RAFLATAC, 2019). Other companies do not directly refer to UN SDGs in their online external communication, except for Lecta Group who participated in Communication on Progress (The United Nations Global Compact, 2019). Even though Avery Dennison does not directly refer to SDGs, they provide a comprehensive, well-structured and complex set of goals and activities within their sustainability efforts, indirectly covering 11 SDGs. (Avery Dennison, 2019). Furtherly, based on information provided, also other examined companies still cover SDGs through their communicated activities.

SDGs of category 2 are very fragmented. The most common SDG communicated by eight companies is Responsible Consumption and Production (12), followed by Life on Land (15) communicated by six companies. Other common SDGs are Good Health and Well-Being (3), Decent Work and Economic Growth (8), Climate Action (13) and Partnerships for the Goals (17). Other SDGs were communicated by four companies and less, and thus, they are not considered the most common considering the sample of category 2.

Conclusions

Companies' communication with the external world, when it comes to sustainable development, is considered very important (Bilinska-Reformat et al., 2018). Our research has shown that communication, particularly via digital media, about sustainability performance becomes an inherent part of the overall communication throughout companies (Reilly & Hynan, 2014), including major paper producing and paper converting companies active in the field of self-adhesive labeling in Europe.

Papermaking companies, belonging to category 1, use digital technologies for on-line communication widely. On the contrary, paper processing companies, belonging to category 2, although generally being active in using on-line tools, communicate about sustainability to a much less extent. One of the possible reasons can be that the paper producing industry, using natural resources in form of wooden fibres, feels a stronger need to reach out for their stakeholders with comprehensive information about its sustainability-related performance.

Further on, we have found a positive correlation between the use of the on-line communication about sustainability generally, and focus on SDGs, in terms of quantity and intensity - a number of tools used, as well as a number of goals communicated - and quality - the content of the communication. Companies seem to follow the SDGs framework as a guidance and a benchmark for what to focus on in the sustainability direction.

Although it is not explicitly measured, it is obvious that the intensity of the communication is positively correlated with the size of the company, in both categories. Some of the companies in the sample (three out of five category 1 companies, as well as Avery Dennison, UPM-Raflatac and Mondi in category 2) reach multi-billion EUR turnover, are globally acting companies with large production sites and customers in multiple countries and continents. Their level of communication on sustainability is more intense than that of the others. This being said does not necessarily mean that the others would be less concerned about sustainability, however, their level of communication is less intense. This may be attributable both to resource availability, as well as to the fact of an objective or subjective need of the large, stock-listed companies, to address their stakeholders, namely (but not only) shareholders with specific information related to adherence to SDGs.

Research limitations, avenues for further research

The selected companies represent the vast majority of the European self-adhesive labeling paper production and processing industry, thus the examined sample is highly representative for the given field of industry. Within the entire European paper industry, significantly contributing to over 80 million tons of paper per year consumed in Europe, there is a large number of other companies and industry segments not included in the present research. What sustainable development goals they focus on and how they communicate them could help to expand the understanding of the communication strategy in the entire industry, particularly with a focus on digital tools.

Second, comparison with other, non-paper industries, esp. from the field of manufacturing on basis of non-renewable resources, could contribute to the identification of the differences in the communication about the sustainable development goals' adherence and progress.

Third, understanding of why companies select particular goals and communicate about these while neglecting the others could be improved. Particularly, whether the other goals are considered irrelevant, or are out of the scope, out of the focus or out of the interest.

Fourth, the interlinkage of the goals with the extant business model and its components is to be examined. Is it mainly the value proposition, value creation, value delivery or value capture (D'Amato, 2020), being the key four identified components of a business model, that are most impacted by the communication of the companies about their performance in the field of sustainable development?

Fifth, since we relied only on the officially and publicly available sources of information, we did not examine the possible gap between what is being communicated towards the external world and what is being done, whether and to what extent the companies live what they communicate.

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Mariana TESAŘOVÁ is a PhD student at the Faculty of Business and Management of Brno University of Technology in the Czech Republic. Dissertation focuses on the topic of sustainable innovations of business models. Research interests: business models, sustainability, digitalization, sustainable innovations.

ORCID ID: orcid.org/0000-0002-1515-0357

Aleš KRMELA is a PhD student at the Faculty of Business and Management of Brno University of Technology in the Czech Republic. Research interests: business models, sustainability.

ORCID ID: orcid.org/0000-0001-6774-8951

Iveta ŠIMBEROVÁ is associate professor and also the vice-dean for international relations of the Faculty of Business and Management at Brno University of Technology in the Czech Republic. Her main research areas are: sustainability, business models: innovations and dynamism. Her publication list involved more than 20 original articles in scientific reviewed journals, 6 specialized books (co-author of specified chapters, 67 articles in reviewed conference proceedings).

ORCID ID: orcid.org/0000-0002-9236-4439

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DOES CORPORATE GOVERNANCE AFFECT FINANCIAL REPORTING QUALITY OF POLITICALLY CONNECTED FIRMS?*

Lela Nurlaela Wati ¹, Ramdany ², Momon ³

^{1,2,3} STIE Muhammadiyah Jakarta, Jalan Minangkabau No. 60 Jakarta Selatan, Indonesia

E-mails: ¹ Lela@stiemj.ac.id; ¹ lela_nwm@yahoo.com; ² Ramdany2012@gmail.com;
³ momon.lesmana@gmail.com

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Abstract. Political connections raise the issue of corporate governance in the disclosure of information. The purpose of this study was to examine the effect of political connections, the effectiveness of the board of commissioners and audit committees, and the quality of external audits on the quality of the company's financial statements. Using a sample of large companies in the Indonesian capital market as many as 871 samples. Regression analysis panel data was used for this analysis. It was found that political connections negatively affect on the quality of financial reporting. The quality of financial reporting of a politically connected firm is lower than those of politically unconnected firms. The effectiveness of the board of commissioners and audit committee is not effective enough in carrying out the internal monitoring function in the company. The influence of political connections can contribute to weak corporate governance and contribute to the low quality of financial reporting. The results of this study are expected to be a reference for investors to determine investment preferences in politically connected companies or not. For management, the results of this study are expected to be a consideration in recruiting the board of commissioners and other policies. Policymakers must encourage or mandate companies to disclose clearer information about the company's relationship with government, political parties, or politicians so that investors and all interested parties can use this information to better assess the quality of the company's financial statements. This study is the first trial to examine more comprehensively the role of political connections, the effectiveness of the board of commissioners and audit committee and the impact of external audit on the quality of financial reporting.

Keywords: The quality of financial reporting; political connection; good corporate governance mechanism

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1. Introduction

Like two sides of a sword, political connections have positive and negative impacts on companies. On the one hand, political connections are proven to be able to provide preferential treatment and ease in various accesses, such as access to funding (Tian and Cheung, 2013), government procurement contracts, public policy, subsidies and taxes (Wu et al., 2012; Tian and Cheung, 2013), licensing trade (Mobarak and Purbasari; 2005), access to company IPO (Francis et al., 2009), as well as increased performance and value of politically connected companies (Tian and Cheung, 2013; Wati et al, 2016b; Wati, 2017). But on the other hand, political connections also have a negative impact on companies, namely high leverage followed by overinvestment (Wu et al., 2012), falling stock prices and stock returns (Fan et al., 2007), declining performance companies (Leuz and Gee, 2006), and the low quality of financial reporting (Chaney et al., 2011; You and Du, 2012; Yen, 2013; Al-dhamari & Ku Ismail, 2015; Habib et al., 2018; Lincényi, Čársky, 2020).

Chaney et al. (2011) stated that politically connected companies have lower financial reporting quality compared to companies that are not politically connected, but these companies will still exist in the capital market because they are considered to have a lower cost of debt. Other evidence was also provided by several previous studies that companies with political connections report their financial reporting of low quality to help cover appropriation efforts by not conducting oversight efficiently documented by You and Du, 2012; Yen, 2013; Al-dhamari and Ku Ismail, 2015; Habib et al., 2018. Politically connected companies tend to have opaque financial reporting, which allows them to be involved in rent-seeking (Chi et al., 2019). However, Batta et al. (2014) showed different results where the financial statements of politically connected firms were higher than those of politically unconnected firms.

Political connections raise the issue of corporate governance in the disclosure and disclosure of information (Leuz and Gee, 2006; Mohammed et al., 2017). The high transparency of financial statements will show a variety of provision of subsidies and other special treatments that raise questions of selfish legality that can threaten the establishment that has been provided by politicians or bureaucrats. The phenomenon of state and government officials both active and non-active who sit as independent commissioners, commissioners or even as president commissioners and concurrently independent commissioners in the company, is suspected to be a bridge for companies to obtain the benefits of political connections including various facilities, such as easy access to funding, access obtain government procurement contracts, obtain large subsidies and reduce tax rates, access to trade licensing, security guarantees for corporate investment and other facilities. They ignore good corporate governance where the board of commissioners as a monitoring function for management is used as a venue for seeking political rent. The results of Wati's (2017) research show that the existence of a board of commissioners with active and inactive background and their activities in politically connected companies is quite effective and has an impact on the value of the company both short and long term. This finding indicates that the existence of officials as an independent commissioner or chief commissioner in the company one of the benefits is to become a bridge for companies to obtain the benefits of political connections including various facilities.

Problems related to the poor quality of corporate financial reporting are often addressed by the weakness of corporate governance in the company and / or the weak philosophy of control by management (Beasley, 1996). The independence of the board of commissioners and the characteristics of board expertise are key factors that influence the quality of financial reporting. Companies, which have a high percentage of independent directors, have independent financial directors, and have a larger number of audit committees will produce quality financial and accounting reports (Yao et al., 2012). The audit committee i tasked with assisting the board of commissioners to monitor the financial reporting process by management to increase the credibility of the financial statements. The audit committee provides formal communication between the board, management, external auditors and internal auditors. The effectiveness of an audit committee can be influenced by three characteristics of the board of commissioners, which include competency, several members and activity (Bradbury et al., 2006), Cadbury

(1995) has focused the composition of the audit committee as an important factor in the quality of financial reporting. Beasley (1996) also states that audit committees that are more independent of management's influence will be better at overseeing the financial reporting process. Dechow et al. (1996) found that the likelihood of accrual discretion was systematically related to weak corporate governance structures and weak management supervision. Chtourou et al. (2001) examined the relationship between GCG and discretionary accruals and found that the board of directors and audit committees effectively limited the activity of discretionary accruals.

The existence of a qualified external auditor can increase the trust of shareholders and users of financial statements. Therefore, audits conducted with good quality can assure that the audited financial statements are free from material misstatements. Watkins et al. (2004) state that the auditor's reputation associated with supervisory power influences the quality of financial statement information so that the information provided through financial statements reflects the actual financial condition of the company (Chen et al., 2010; Challen, 2011).

Based on this description, this study aims to examine the influence of political connections, the effectiveness of the board of commissioners, the effectiveness of the audit committee and the role of external audits on the quality of the company's financial statements. This study examines more comprehensively political connections in large companies in Indonesia, thus making this study different from previous studies. This study deepens the findings of Beasley, 1996; Beasley et al., 2000; Dechow et al., 1996; Chtourou et al., 2001; Chaney et al., 2011; You and Du, 2012; Yen, 2013; Aldhamari & Ku Ismail, 2015; Habib et al., 2018; Wati, 2017; Chi et al, 2019 and Jacoby et al. This study combines several independent variables, namely political connections, the effectiveness of the board of commissioners and the audit committee used by previous researchers separately. The effectiveness of the board of commissioners and the audit committee in this study is measured by independence, activity, the board size, education and experience of the board of commissioners and the audit committee as well as the role of the external audit comprehensively on the quality of company reporting. This study uses control variables namely company size, profitability, leverage and age of the company. Robust models use different measurements of the quality of financial statements, Kothari models.

2. Literature Review

In this section, we discuss the relations among these factors as studied in the relevant literature and proceed to develop the hypotheses. Political connection theory, resource dependence theory and agency theory are used as theories that underlie this research.

2.1. The Effect of Political Connections on the Quality of Financial Reporting

Financial statements have a function as a means of communication between management and users of financial statements. Various information conveyed in the financial statements aims to estimate the value of the company in the future carried out by related parties as a basis for decision making. One of the main information that is of interest to users of financial statements is earnings information. According to Chaney et al. (2011), three things are usually done by politically connected companies on their financial reporting. First is that companies usually take advantage of their political relations by embezzling corporate funds or at least delaying profit reporting with the aim of misleading investors thereby increasing the costs they will incur so that companies are less interested in obtaining foreign funding due to demands for transparency of financial statements will reduce political effects (Leuz et al, 2003; Leuz and Gee, 2006). Second, politically connected companies feel safe from sanctions or penalties for reporting low-quality financial statements, the impact the company will be more careless in terms of presenting a quality financial report. Third, there is a simple reason that every company with low financial reporting quality does tend to form its political relations. These three views can be measured using an accrual quality proxy.

Empirical evidence from the political connections literature shows that the quality of financial reporting of politically connected companies is different from companies that are not politically connected. However, the results of the direction of the influence of political connections on the quality of corporate financial reporting

vary. On the one hand, career development and bonus motives motivate politically connected company managers to engage in positive or aggressive earnings management (Leuz and Gee, 2006; Chaney et al., 2011; You and Du, 2012), so that politically connected companies show more aggressive earnings management compared to companies that are not connected politically. But on the other hand, politically connected companies can use negative (conservative) earnings management to get government bailouts and negotiate for more government assistance in the form of subsidies (Faccio et al., 2006; Faccio, 2010). Faccio (2010) examined the differences between politically connected and non-politically connected companies in 47 countries. The results show that companies with political connections have higher profit levels and higher market share, this result is supported by Wati et al (2016a) and Wati (2017). However, empirical studies conducted Chaney et al., 2011; You and Du, 2012; Yen, 2013; Aldhamari & Ku Ismail, 2015; Habib et al., 2018; Jacoby et al., 2019 shows that the performance of financially connected corporate financial statements is lower compared to companies that are not politically connected. Political connections can weaken or limit managerial capacity and increase the potential for fraudulent financial statements. The existence of political connections encourages increasing levels of corruption and exacerbates information asymmetry between investors and managers (Wang et al., 2017; Chen et. al, 2010). Based on the description above, the first hypothesis is made:

H₁: Political connections negatively affect the quality of corporate financial reporting

2.2. The Effect of the Effectiveness of the Board of Commissioners on the Quality of Financial Reporting

Corporate governance is a set of mechanisms that can protect minorities from expropriation by managers and controlling shareholders. The mechanism of controlling corporate governance can be carried out through external and internal mechanisms. The external control mechanism is the control of the company based on the market mechanism while the internal mechanism is the control carried out by the board of commissioners including the committees under it, the board of directors, management and shareholders, or through an attractive and competitive incentive scheme for management (Wati, 2016a; Wati et al., 2017). This study uses an internal mechanism with controls carried out by the board of commissioners and the audit committee as well as the role of the external audit, in this case, the public accounting firm that audits the company's financial statements.

The board of commissioners is one of the main factors of the internal mechanism of corporate governance because the board of commissioners acts as a representative of the owner of the company who oversees management in managing the company. The board of commissioners in carrying out their duties is required to be independent and always pay attention to the interests of the company, and other stakeholders above personal or group interests. In practice in Indonesia, it often happens that members of the board of commissioners do not carry out their very basic supervisory role towards the board of directors. The board of commissioners is often considered to have no benefits, this can be seen in the fact, that many members of the board of commissioners do not have the ability and can not show their independence. In many cases, the board of commissioners also failed to represent the interests of other stakeholders besides the interests of the majority shareholder. The existence of the board of commissioners in the company functions more like a rubber stamp for decisions made by management (Hermawan, 2012; Wati, 2017). This condition occurs because the process of selecting the board of commissioners tends to be less democratic where the candidates for the board of commissioners are often chosen by management so they do not dare to criticize management.

Beasley (1996) concluded that smaller boards will be more effective in supervising actions than larger boards. Chtourou et al. (2001) gave different results, whereby the board of commissioners with large numbers was able to monitor financial reporting more effectively. This indicates that the large size of the board of commissioners can monitor the financial reporting process more effectively than the size of the small board of commissioners. The increasing number of the board of commissioners will be very helpful in its function as supervisor of management performance so that the quality of the financial statements produced can also be managed well (Anderson et al., 2003). Uadiale's research (2010) shows that companies with a large number of board of directors members will be more effective in supervising, to improve the company's financial performance compared to companies that have

a smaller number of board of directors' members. Wati's findings (2017) support Chtourou et al. (2001), Anderson et al. (2003) and Uadiale (2010) that the greater the number of board of commissioners in the company, the monitoring function will increase, but when using the moderation of political connections, it reverses the direction where the more the number of boards, the monitoring function will decrease. Based on the literature review and previous researches, Hypothesis 2a is formulated as follows:

H2a: Board of Commissioners size has a positive effect on the quality of financial reporting

Independent commissioners can act as mediators in disputes that occur between internal managers, oversee management policies, and provide advice to management. An independent commissioner is the best position to carry out the monitoring function to create a company with good governance. The strength of the board of commissioners is shown by the composition of the membership of the independent board of commissioners. Companies that have a large composition of independent directors will prevent management opportunistic behaviour so that they can produce financial reports with better quality financial statements and lower discretionary accruals (Qinghua et al., 2007). Di Donatto and Fiori (2012) also emphasized that the independence of the board of commissioners was a factor that could hamper discretionary accruals. The more the number of independent commissioners, the better the quality of the company's financial reporting. This result is supported by Mohammed et al (2017) which shows that independent commissioners have a positive effect on the level of caution in corporate financial reporting.

Research conducted by Chen et al. (2010) which specifically examines whether the independence, financial expertise and voluntary information of an independent board of directors are related to the absolute value of discretionary accruals. The results state that the independence of the board, the financial competence of the independent directors, and the voluntary formation of the independent board of directors are related to the lower tendency of discretionary accruals or the higher quality of corporate financial reporting. Qin and Liwen (2007) in their research stated that the ability of the board of directors in terms of effective supervision will increase along with the increasing number of an independent board of directors in a company. Klein (2002) also states that an independent board of directors can be more effective in conducting supervision. Besides that, Xie et al. (2003) have empirically proven that independent commissioners and audit committees who are active and knowledgeable about finance are important factors in preventing managers' tendencies to discretionary accruals. Based on the literature review and previous researches, Hypothesis 2b is formulated as follows:

H2b: The independent board of commissioners positively influences the quality of financial reporting

An active board of commissioners will hold regular meetings to find out issues in more detail and earlier so that more systematic supervision can be carried out. The activities of the board of commissioners as measured by the number of meeting frequencies can affect the effectiveness of the board's role in monitoring management actions, particularly concerning the process of presenting financial statements. (Vafeas, 1999), Anderson et al. (2003) and Xie et al. (2003) also states that board activity as measured by meeting frequency can also affect the effectiveness of the board. Research conducted by Brick and Chidambaran (2010) states that board activity includes the frequency of the number of meetings attended by the board and structural changes in the board subcommittees, as well as the activities of the board will determine the level of supervision quality of the board. The frequency of meetings has been widely used as a proxy to measure the activities of the board of commissioners, the higher the frequency of meetings will increase the effectiveness of the board of commissioners. This is because the higher the activities carried out by the board, it will increase the disclosure of information which will ultimately reduce the level of information asymmetry. Based on the literature review and previous researches, Hypothesis 2c is formulated as follows:

H2c: The activity of the board of commissioners has a positive effect on the quality of financial reporting

Competence possessed by members of the board of commissioners is a very important factor for the creation of an effective board of commissioners (Cadbury Report, 1992). Competence can be seen from the educational background and experience of members of the board of commissioners. To be able to understand and oversee the

process of presenting the company's financial statements, it is specifically expected that members of the board of commissioners have knowledge or background in finance and accounting (Hermawan, 2012).

This competence will affect the ability of the board of commissioners in carrying out their functions to conduct oversight optimally. Jeanjean and Stolowy (2009) found that accounting expertise on average was negatively related to the type of board (two-tier versus one-tier) and growth opportunities, and positively related to board independence, ownership concentration and institutional ownership.

The experience possessed by an outside independent board can be reflected in the position or job owned by the person concerned. Experience as a board member in another company, CEO or former CEO of another company, or management consultant will be able to improve the competence of the monitoring role of the outside independent board. It can be concluded that the background knowledge and experience of the board of commissioners will affect the effectiveness of the monitoring role of the board of commissioners. Chtourou et al. (2001), Carcello et. al. (2006), and Hermawan (2012) explained that in addition to the independence of the board of commissioners, expertise (expertise) in the field of accounting and finance proved to be able to limit management in conducting accrual discretion. Xie et al. (2003) support this statement where there is a negative influence from the background of financial knowledge held by the board of commissioners on accrual discretion. This shows that the educational background and experience of the board of commissioners can control and hinder management from conducting accrual discretion, to produce quality financial reports. Based on the literature review and previous researches, Hypothesis 2d and 2e is formulated as follows:

H2d: Board of Commissioners education has a positive effect on the quality of financial reporting

H2e: The Board of Commissioners' experience has a positive effect on the quality of financial reporting

2.3. The Effect of The Effectiveness of The Audit Committee on The Quality of Financial Reporting

The implementation of good corporate governance will have an impact on the quality of the financial statements produced. Management will find it difficult to manipulate financial statements because of the supervision of the board of commissioners so that the resulting financial statements will be following the actual situation and integrity. Conversely, poor corporate governance will have an impact on the failure of the objectives of the financial statements (Norwani et al, 2011).

To support the duties of the board of commissioners in the company's internal control mechanism, the board of commissioners is assisted by an audit committee so that the effectiveness of the audit committee also affects the quality of the company's financial reporting (Chtourou et al., 2001). In carrying out its duties the audit committee provides formal communication between the board, management, external auditors, and internal auditors. the effectiveness of an audit committee can be influenced by three characteristics which include competence, number of audit members and audit activities (Bradbury et al., 2006). Qinghua et al (2007) produced a study in which the number of audit committees affected the quality of financial statements. This result is supported by Soliman and Ragab (2014), Inaam and Khamoussi (2016) which results that the audit committee influences the quality of the report finance.

Bedard et al., (2004) argue that the greater the audit committee, the more likely it is to uncover and resolve potential problems in the financial reporting process because it is likely to provide the necessary strength and diversity of views and expertise to ensure the effectiveness of monitoring. Klein (2000) produced research on the nonlinear negative relationship between the independence of the audit committee and earnings management. Klein also said that a more independent board structure would be more effective in overseeing the company's financial reporting process. Veronica and Bachtiar (2005), Inaam and Khamoussi (2016) state that the independence characteristics of the audit committee have a negative influence on the likelihood of earnings management. However, Xie et al. (2003) found an insignificant relationship between the number of audit

committees and earnings management as a measure of the quality of financial statements. Based on the literature review and previous researches, Hypothesis 3a is formulated as follows:

H3a: Audit committee size has a positive effect on the quality of financial reporting

Bryan et al. (2004) mention other important characteristics that must be possessed by the audit committee are the frequency of meetings, expertise in finance, and time commitment. These three factors are the key determinants of the effectiveness of the audit committee. This characteristic can influence the financial reporting process. Abbot et al. (2004) found evidence that audit committees that met less than the minimum number were more likely to restate their profits. He also found evidence that fraud and restatement of profits occurred more and more when audit committee members lacked competence in the financial sector. The effectiveness of the audit committee will decrease when its members work in many companies.

They stressed that the experience of working at other companies initially could increase the effectiveness of audit committee members. However, this situation quickly reversed when audit committee members worked in many other companies (more than three companies). The frequency of audit committee meetings as one of the characteristics of the audit committee can affect the quality of the company's financial reporting. An effective audit committee meets regularly to ensure that the financial reporting process is functioning properly, and therefore a well-functioning and active audit committee may prevent earnings management. Previous research conducted by Hermawan (2012), Soliman and Ragab (2014), Inaam and Khamoussi (2016) stated that the higher frequency of meetings conducted by the audit committee its supervisory activities will be higher which causes the high quality of financial statements. Xie et al. (2003) examined the role of the board and audit committee in preventing earnings management practices. As a result, the activities of the board and audit committee (which is proxied by the number of meetings they do) and the superiority of background in their financial fields can be important factors to limit the possibility of managers carrying out earnings management practices. Based on the literature review and previous researches, Hypothesis 3b is formulated as follows:

H3b: Audit committee activities have a positive effect on the quality of financial reporting

Chtourou et al. (2001) state that companies that have more active audit committees and boards of commissioners have a negative relationship with earnings management. Chtourou et al. (2010), companies that have more audit committees and have competence in the field of finance and accounting have a negative influence on earnings management. Dhaliwal, et al. (2006) states that the characteristics of the audit committee in the form of accounting, financial and supervisory competencies they have have a positive effect on the quality of the accruals contained in the published financial statements.

The audit committee's financial expertise increases the likelihood that detected material misstatements will be communicated to the audit committee and corrected promptly. Marra et al. (2011) found that audit committee financial expertise has a negative relationship with earnings management. A high level of financial sophistication is needed for audit committee members to increase the effectiveness of the audit committee in monitoring discretionary accruals. This result is supported by Inaam and Khamoussi (2016) where the expertise of the audit committee affects the decline in earnings management and improving the quality of financial statements. Based on the literature review and previous researches, Hypothesis 3c and 3d is formulated as follows:

H3c: Education audit committee has a positive effect on the quality of financial reporting

H3d: The experience of the audit committee has a positive effect on the quality of financial reporting

2.4. The Influence of External Audit on The Quality of Financial Statements

External auditors are responsible for verifying that the financial statements are fairly stated by GAAP and reflect the company's economic conditions. Thus, external auditor verification adds credibility to the company's financial statements. Qualified external auditors are expected to limit opportunistic earnings management. External auditors with quality audits can increase the confidence of shareholders and users of financial statements because audits conducted with good quality can assure that the audited financial statements are free from material misstatements

so that the published financial statements are believed to contain no elements of management practice earnings especially accrual earnings management.

Watkins et al. (2004) state that the auditor's reputation which is connected with the supervisory power influences the quality of financial statement information so that the information provided through the financial statements reflects the actual economic situation. Klein (2003) states that big4 auditors can transfer some of their responsibilities to monitor financial reporting to the audit committee. Besides, Big4 auditors can provide higher audit quality for reasons of having many clients, lots of resources, technology, and trained staff for audit work and they don't want to lose their clients due to process violations.

The literature recognizes that the big4 auditors provide higher audit quality and offer greater reliability to client financial statements than non-Big 4 auditors. The results of Ahsen (2011), Soliman and Ragab (2014) show that Big 4 auditors are better at limits earnings management compared to non-Big 4 auditors. They find that clients of non-Big 4 auditors have higher discretionary accrual rates. In the same context, Ahsen (2011) found that Big 4 auditors associate with fewer earnings management in the company. Indeed, Big 4 audit companies are assumed to have higher audit quality than non-Big 4 audits, because they are less dependent on their clients. This is supported by Ahmad et al. (2016) which shows evidence that audit quality in Indonesia influences the decline in earnings management which has an impact on improving the quality of the company's financial statements. Chen et al. (2010) state that good audit quality has a significant effect on accrual earnings management. Challen (2011) also states that audit quality has a significant effect on real earnings management. Johnson et al. (2002) show the results of research in which the size of the accounting firm and the high competence of auditors from public accounting firms allow the quality of the audit report to be better and have an impact on the quality of financial statements.

H4: Audit quality has a positive effect on the quality of financial reporting

2.5. The Influence of Firm Size, Profitability, Leverage and Firm Age on The Integrity of Financial Statements (Control Variables)

To control independent variables outside the model, firm size, profitability, leverage and firm age variables are included as control variables to control the effect of independent variables on the integrity of financial statements. This refers to positive accounting theory related to the theory of plan bonus hypotheses, debt covenants and political cost hypotheses (Watts and Zimmerman, 1986).

The size of the company is a value that indicates the size of the company. The greater the company and its area of business resulted in the owner not being able to manage the company himself directly. This is what triggers agency problems. Large companies tend to make earnings management actions smaller than smaller companies because large companies are seen as more critical by outsiders, both by investors, creditors, the government and the public.

Based on the theory and previous research, the author makes the following framework:

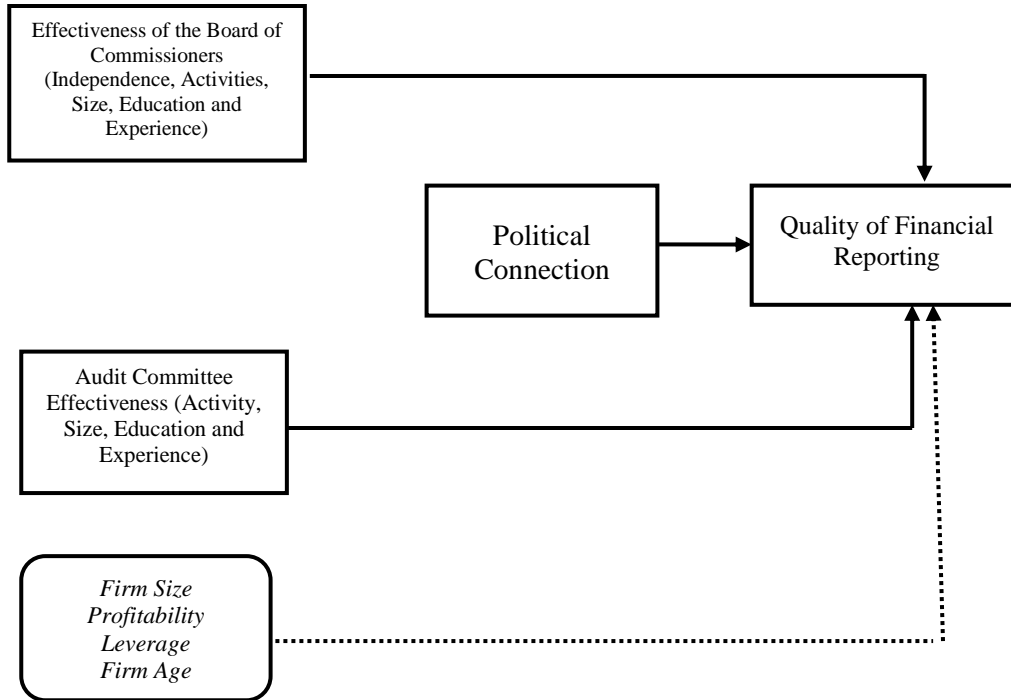


Figure 1. Conceptual Framework

Source: a Literature review

3. Methodology

The sample of this research is a large company listed on the Indonesia Stock Exchange since 2005-2017 were 75 companies and which can be processed as many as 67 companies (2005-2017), so the total of observations is 871 samples. The dependent variable in this study is the quality of financial reporting proxied by discretionary accrual using the Jones modified model. The independent variable used is a political connection, Board of commissioners' effectiveness, audit committee effectiveness and audit quality. Board of commissioners' effectiveness consists of board size, independent board, board meeting, board education and board expertise. Audit committee effectiveness consists of audit size, audit meeting, auditor education and auditor expertise. Control variables are firm size, profitability, leverage and firm age.

The discretionary accrual measure used as a comparison to the Jones modified model is the Kothari model. The value of the accrual discretion resulting from earnings management calculations is multiplied by a negative one to ensure that a positive value indicates a higher quality of financial statements. If the discretionary accrual value is positive, then earnings management is done by increasing earnings. If the discretionary accrual value is negative, then earnings management is done by lowering earnings. If the discretionary accrual value is zero, then there is no indication of earnings management.

The political connection uses political connection criteria according to Faccio, 2006; Wati et al, 2016; Wati, 2017. If one of the shareholders of the company or the top management of the company is a member of parliament, ministers or heads of state, or who has a close relationship of them as political party officials, the army and police

officials. The members of parliament, ministers, or heads of state former included because they still have the power to connect with government. Robust models are used to accrual-based on Kothari models. Table 1 below describes the operational variable:

Table 1. Description of variables

Variables	Description
Dependent: Discretion Accrual	Modified Jones Model: $TA_{it} = NI_{it} - CFO_{it}$ $TAC/A_{t-1} = \beta_1 (1/A_{t-1}) + \beta_2 ((\Delta REV_t)/A_{t-1}) + \beta_3 (PPE/A_{t-1}) + e$ $NDA_t = \beta_1 (1/A_{t-1}) + \beta_2 ((\Delta REV_t - \Delta REC_t)/A_{t-1}) + \beta_3 (PPE/A_{t-1})$ $DA_t = TA_t/A_{t-1} - NDA_t$
Independent: Political Connection Board of Commissioners Effectiveness Variables: Independence Board Board Size Board Meeting Board Education Board Experience Audit Committee Effectiveness Variables: Audit Size Audit Meeting Audit Education Audit Experience Audit quality Control Variables: Firm Size Profitability Leverage Firm Age	Dummy Variable: 1 = political connected 0 = non political connected The ratio of Independence commissioners board to the amount of BoC The amount of commissioners board The amount of commissioners board Meeting The proportion of commissioners education The proportion of commissioners experience The amount of audit committee The amount of audit committee meeting The proportion of audit committee education The proportion of audit committee experience Dummy variable: 1 = If the big 4 of accounting public; 0 = otherwise Log of total assets The ratio of net profit to total assets The ratio of debt to total equity Number of years since incorporation

Source: Literature review

To test the hypotheses 1-4 of this study, we used the following regression model:

$$DA = \alpha + \beta_1 PC_{it} + \beta_2 BOC_{it} + \beta_3 Indep_{it} + \beta_4 BMeet_{it} + \beta_5 BEduc_{it} + \beta_6 BExpt_{it} + \beta_7 Audit_{it} + \beta_8 AMeet_{it} + \beta_9 AEduc_{it} + \beta_{10} AExp_{it} + \beta_{11} Big4_{it} + \beta_{12} Size_{it} + \beta_{13} ROA_{it} + \beta_{14} DER_{it} + \beta_{15} Age_{it} + \varepsilon \dots \dots \dots (1)$$

4. Results & Discussion

Table 2. Descriptive statistic of the Variables from 2005-2017

Variable	Min	Max	Mean
Political Connection	0	1	0.73
Discretion Accrual (Jones)	-33.05	25.78	0.03
Discretion Accrual (Kothari)	-33.12	25.74	-0.028
Discretion Accrual Political	-33.05	25.78	0.108
Discretion Accrual Non-Political	-17.51	5.47	-0.18
Independence	0.14	1	0.45
Board Size	2	13	5.62
Board Meeting	2	123	13.19
Board of Education	0	1	0.81
Board Experience	0	1	0.94
Audit Size	2	9	3.56
Audit Meeting	1	48	11.33
Audit Education	0.25	1	0.82
Audit Experience	0.33	1	0.99
External Audit Big4	0	1	0.64
Firm Size (Log)	10.93	15.05	12.99
Profitability	-1.08	1.24	0.06
Leverage	-31.44	25.79	1.61
Firm Age	1	64	17.59

Source: Data IDX processed, 2019

Based on table 2, the lowest discretionary accrual value in politically connected companies is -33.5 and the highest is 25.78 with an average value of 0.108. These results indicate that both the lowest, highest value and the average of the Accrual Discretion in politically connected companies are higher than companies that are not politically connected. This shows that politically connected companies are very aggressive in managing earnings either by reducing profits or increasing profits.

The high earnings management in politically connected companies indicates poor financial statements. The results of this study support Bushman & Piotroski, 2006; Piotroski et al. 2004; Leuz & Gee 2006; Chaney et al., 2011; You and Du, 2012; Yen, 2013; Aldhamari & Ku Ismail, 2015; Habib et al., 2018; Jacoby et al., 2019 which shows that the quality of financial statements of politically connected firm is lower than those of politically unconnected firms.

The average value of discretionary accruals in politically connected companies has a positive value of 0.108, which means that politically connected companies do earnings management by increasing earnings or overstatement, while companies that are not politically connected do earnings management by lowering profits or accounting conservatism.

Table 3. Regression Analysis Model

Variable	Prediction	Main Model (Jones)	Robust Model (Kothari)	Result
Constant		-1.0544***	-1.2899***	
Political Connection	β -	-0.1591***	-0.1409***	Supported
Board Size	β +	0.0101**	0.0097**	Supported
Independence	β +	-0.1427**	-0.0849	Unsupported
Board Meeting	β +	-0.0034***	-0.0024***	Unsupported
Board of Education	β +	-0.0927**	-0.0574	Unsupported
Board Experience	β +	-0.136	-0.1377	Unsupported
Audit Size	β +	-0.1206***	-0.135***	Unsupported
Audit Meeting	β +	-0.0021*	-0.0026*	Unsupported
Audit Education	β +	-0.0567	0.0074	Unsupported
Audit Experience	β +	0.2663	0.3009	Unsupported
External Audit Big4	β +	0.1183***	0.1329***	Supported
Firm Size (Log)	β +	0.1318***	0.1415***	Supported
Profitability	β +/-	-0.588***	-0.0222	Supported
Leverage	β +/-	0.0099**	0.0081**	Supported
Firm Age	β +/-	-0.0043***	-0.0038***	Supported
R ²		0.3457	0.2925	
Adjusted R ²		0.3342	0.2801	
statistics		29.9768***	23.4581***	

Source: Data IDX processed, 2019

***Significance at 1%, **5%, and * 10%

Based on table 3, found that political connections have a significant negative effect on the quality of financial statements of both the Jones model and the Kothari model. The results of this study support the theory of political connection, the theory of resource dependence, where companies will overcome interdependence and uncertainty by establishing connections to the source of interdependency and uncertainty, namely the government, so that building political connections can benefit the company. The results of this study also support previous researchers Leuz & Oberholzer-Gee, 2006; Chaney et al., 2011; You and Du, 2012; Yen, 2013; Aldhamari & Ku Ismail, 2015; Habib et al., 2018 which shows that the quality of financial statements of politically connected companies is lower than companies that are not politically connected.

If seen from the mean of the Accrual Discretionary in politically connected companies, the value is positive and greater than companies that are not politically connected. This is an indication that career development interests and bonus motives motivate politically connected company managers to engage in positive earnings management. Political connections can weaken or limit managerial capacity and increase the potential for fraudulent financial statements. The existence of political connections can encourage increased levels of corruption and worsen information asymmetry between investors and managers (Wang et al., 2017; Chen et. al, 2010). These findings also support what Shleifer and Vishny (1994) say, that government intervention in the economy is driven by the need to have control over companies in order to provide jobs, subsidies and other benefits to their supporters, who are expected to provide assistance in the form of votes in elections, funding contributions and bribes. This is due to the very dominant role of government in a country, especially in research discussions in Indonesia.

The results of testing the effect of the effectiveness of the board of commissioners on the quality of financial reporting have no significant effect. Of the five characteristics of the board of commissioners, only the size of the board of commissioners has a significant positive effect on the quality of financial statements. These results indicate that the large size of the board of commissioners can monitor the financial reporting process more

effectively than the size of the small board of commissioners. Increasing the number of the board of commissioners will be very helpful in its function as a supervisor of management performance so that the quality of the financial statements produced can also be well managed (Chtourou et al., 2001; Anderson et al., 2003; Uadiale, 2010; Wati, 2017).

The test results of the independent board of commissioners and the activity of the board of commissioners have a significant negative effect on the quality of financial statements both by measuring modified Jones and Kothari models. The results of this study do not support agency theory, where independent commissioners and their activities are internal control mechanisms that should prevent management opportunistic behaviour to produce financial reports with better quality financial statements and lower discretion accruals. These results are not following the study of Qinghua et al., 2007; Di Donato and Fiori, 2012; and Mohammed et al., 2017. But support the results of Lara et al. (2007) and Wati (2017) where independent commissioners and board activities in large companies do not affect the performance of the company's financial statements. This empirical evidence shows that the ability of independent commissioners and their activities to monitor will decrease with the increasing size of the independent board of commissioners because it will cause problems in coordination, communication and decision making, especially in large companies. The educational background and experience of the board of commissioners in large companies are unable to control and hinder management from doing accrual discretion, resulting in poor quality financial statements.

The results of testing the effectiveness of the audit committee on the quality of financial statements are also ineffective. The size of the audit committee and the activities of the audit committee have a negative effect on the quality of the company's financial statements. The greater the size of the audit committee and its activities, the less likely it is to uncover and resolve potential problems in the financial reporting process. The results of this study also do not support the internal mechanisms of corporate governance and are in conflict with previous researchers which produced audit committees and their activities have a positive effect on the quality of financial statements (Bédard et al., 2004; Veronica and Bachtiar, 2005; 2013; Soliman and Ragab, 2014; Inaam and Khamoussi, 2016). The ineffective role of the board of commissioners and audit committee in carrying out their monitoring functions in large companies indicates that their existence as an internal mechanism of corporate governance in the company raises a big question mark. These results indicate that the CEO has more power than the board of commissioners and the audit committee. This condition occurs because the process of selecting the board of commissioners tends to be less democratic where the board of commissioners' candidates are often chosen by management so they do not dare to criticize management. Member of the board of commissioners does not have the ability and cannot demonstrate their independence. In many cases, the board of commissioners also failed to represent the interests of other stakeholders other than those of the majority shareholder.

The results of testing the influence of independent commissioners and their activities as well as the size of the audit committee and their activities on the quality of financial statements provide evidence that management in large companies will easily manipulate financial statements due to the weak supervision of the board of commissioners and audit committee so that the financial statements produced will not be in accordance with the circumstances actually and will have an impact on the failure of the objectives of the financial statements. The results of this study support the phenomenon of rampant overstatement by large companies in Indonesia.

Another characteristic of the audit committee is the auditor's competence as measured by education and experience. The test results show that the education and experience of the audit committee do not significantly influence the quality of financial statements. That is, the competence of the audit committee is not a determining factor in the quality of the company's financial statements. The auditor's competency test results do not support previous researchers Dhaliwal, et al. (2006), Marra et al. (2011), Inaam and Khamoussi (2016) which show that the accounting, financial and supervisory competencies of the audit committee have a positive effect on the quality of the published financial statements.

External auditor quality has a significant positive effect on the quality of financial reporting. The results of this study support previous researchers Johnson et al. (2002), Chen et al. (2010), Ahsen (2011), Soliman and Ragab (2014), Ahmad et al. (2016) which shows that audit quality affects the quality of the company's financial statements. This empirical evidence shows that qualified external auditors can limit opportunistic earnings management. Major companies in Indonesia mostly use the big4 external auditors, as many as 59% and show the results of a significant influence on the quality of the company's financial statements. External audits conducted with good quality can assure that the audited financial statements are free from material misstatements. Quality external auditors can increase the trust of shareholders and users of financial statements because audits conducted with good quality can assure that the audited financial statements are free from material misstatement so that the published financial statements are believed to have no elements of earnings management practices in particular accrual earnings management.

All control variables, profitability, leverage, and firm age have a significant effect on the quality of the company's financial statements. Testing the quality of financial statements using the Kothari model is consistent with the results of the modified Jones model testing, so the results of this test can be said to be robust.

5. Conclusion

Empirical evidence shows that political connections negatively affect the quality of financial reporting. Politically connected companies in Indonesia carry out more aggressive earnings management compared to companies that are not politically connected. The results of this study support the theory of political connection and resource dependence theory. The high transparency of financial statements will show various kinds of provision of subsidies and other special treatments which raise questions of selfish legality that can threaten the stability that has been provided by politicians or bureaucrats so that they do earnings management which causes the integrity of the company's financial statements is low. Political connections also raise the issue of corporate governance in the disclosure and disclosure of information. Empirical evidence shows that the effectiveness of the board of commissioners and audit committee is not effective enough in carrying out the internal monitoring function in the company. These findings support (Bushman, Piotroski et al., 2004; Leuz & Oberholzer-Gee, 2006) where political influence can contribute to weak corporate governance and weak corporate governance contributing to the low quality of financial reporting (Wright, 1996; Shen & Chih, 2007; Lara et al., 2007).

The board of commissioners and the audit committee, which should act as a control mechanism of corporate governance, cannot perform their duties as expected because of the political influence that can lead to weak governance structures that better accommodate the interests of the government or politicians (Wati, 2017). The board of commissioners, especially the independent commissioners and audit committees should have the responsibility of ensuring the implementation of the company's strategy goes according to objectives, oversees management in managing the company and requires accountability, but they fail to control management in presenting quality financial reports. They have no ability and cannot demonstrate their independence so they have also failed to represent the interests of other stakeholders other than those of the majority shareholder. CEOs in large companies tend to have greater strength than the board of commissioners. The results of empirical testing also provide evidence that the quality of external audits affects the quality of financial statements. These results indicate that large companies realize the importance of an audit reputation, although, in the end, not a few large companies, which are subject to sanctions due to earnings management cases in the financial statements of companies in Indonesia which have also dragged reputable accounting firms to audit them.

The findings of this study indicate that policymakers must encourage or mandate companies to disclose clearer information about the company's relationship with government, political parties, or politicians so that investors and all interested parties can use this information to better assess the quality of the company's financial

statements. The results of this study are also expected to be a reference for investors to determine investment preferences in politically connected companies or not. For management, the results of this study are expected to be a consideration in recruiting the board of commissioners and other policies.

The limitation of this study is that it only uses samples from large companies with the reason that they contribute greatly to the capital market and economic growth. Future research is expected to add samples in all categories of companies and compare them with companies in other developing country capital markets.

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Dr. Lela Nurlaela WATI, MM is an Associate Professor of STIE Muhammadiyah Jakarta, Indonesia. She is currently reviewer a National and International Journal. Her publication has appeared in various international journals, such as Entrepreneurship and Sustainability Issues, Pertanika Journal of Social Sciences and Humanities, Actual Problems of Economics, Internatioanal Journal of Business Economics and Law, South East Asia Journal of Business Economics and Law.

ORCID ID: <https://orcid.org/0000-0001-7046-612X>



Dr RAMDANY, SE. Ak., M.Ak. C.P.A is an Assistant Professor of STIE Muhammadiyah Jakarta, Indonesia. He is currently reviewer a National Journal. Her publication has appeared in various National and International journals, such as International Journal of Business Economics and Law, Risk Governance and Control: Financial Markets & Institutions, Ekobis Journal, and Accounting Journal.

ORCID ID: <https://orcid.org/0000-0001-6707-3704>



MOMON, SE. Ak., M.Ak. CRMP is Lecturer of STIE Muhammadiyah Jakarta and Dep. General Manager Auditor at PT. Somp Indonesia.

ORCID ID: <https://orcid.org/0000-0003-0338-6677>



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HOW TO MEASURE AND COMPARE THE VALUE OF ORGANIZATIONS. THE CASE STUDY OF HEIS*

Marzena Wójcik-Augustyniak

Faculty of Social Sciences, University of Natural Sciences and Humanities, Siedlce, Poland

E-mails: marzena.wojcik-augustyniak@uph.edu.pl

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Abstract. In an age of general and permanent evaluation of everyone and everything, the issue of finding measures and methods of measuring value has come to the fore. Evaluation (or measurement of value) has been a subject of a number of publications; a lot of methods (better or worse) of measuring the value of organisations and workstations have been devised. The purpose of the paper is to attempt to use radar charts to support the measurement and comparison of the value of universities as an example of organisations. The research question is the following: How can radar charts be used to measure and compare the value of organisations? The hypothesis formulated assumes that radar charts can be used in various areas of analysing the value of organisations, including: to measure the value of organisations (dynamic); to make multi-criteria comparisons of organisations; to evaluate organisations from the point of view of various groups of stakeholders. The comparative research was done at 11 public universities located in 6 Eastern European countries (Bulgaria, the Czech Republic, Hungary, Poland, Romania, Slovakia) and two other public universities, one in Great Britain and the other in the United States, which were a type of benchmarks. The criteria constituting the value of universities that were adopted for the research were measurable (objective) factors taken into account in university rankings: Faculty/ Student Ratio, International Faculty Ratio, International Student Ratio, Citation, Industry income, Patents awarded (size-normalised), Regional joint publications, Presence and Impact. The research done with the use of radar charts let the author carry out the measurement of the value and a comparative analysis of selected universities, and draw conclusions.

Keywords: value; radar chart; universities; comparative analysis; stakeholders

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JEL Classifications: M10, I21, I23

1. Introduction

In days when everything and everyone (products, companies, employees, and science) is subject to evaluation, the issue of defining the value, differentiating the value and measuring the value is becoming more and more important. As long as the assessment of the value of products or material resources is easy to make, the evaluation

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(measurement) of the value of an organisation and employees may cause some difficulties. How can the value be measured? From the viewpoint of various groups of stakeholders value can take various forms. It is different for the company owner (owners), investors, shareholders and cooperators, and different for clients, workers and prospective workers.

Since there are so many points of view in the case of an enterprise and approaches to the issue of the assessment of the value, the evaluation of the value of such organisations as universities seems to be even more problematic. What measures should be used to evaluate the value of a university? The same as in the case of companies, the value is assessed by various stakeholders: employees, students, university authorities, government, society, and students' families. How to measure the value of what the university gives? The question is not about the material value, which is quite easy to evaluate (the value of land, buildings, equipment), but about the value that the university gives: the value of educational service, the value of scientific research, the value of patents, and the value of graduates on the labour market. How to measure the value? The evaluation is made even more difficult in this case due to the fact that the value of university's products changes over time. What factors and measures should be used to at least come closer to the assessment of the value of each university from the viewpoint of various groups of respective stakeholders?

In this paper attempts were made to measure the value of selected universities with the use of radar charts and mathematical formulas. What was done was a comparison of various factors that are important when assessing universities in international rankings, such as: QS, THE, U-Multirank and Webometrics.

Factors taken into account in the comparative analysis of the value of universities were as follows: Faculty/Student Ratio, International Faculty Ratio, International Student Ratio, Citation, Industry income, Patents awarded (size-normalised), Regional joint publications, Presence, and Impact (online visibility).

Making an assumption that it is more justified to choose organisations from countries at a similar stage of development and more importantly of similar possibilities of development, the author focuses on universities from Eastern Europe in the paper. To present the global situation of the public universities subject to the review, they have also been compared to public universities in the USA and the EU that could be treated as a kind of benchmarks. The reference to the benchmarks was not intended to illustrate what the Eastern European universities should do to unquestionably, absolutely and at any cost come close to those models, but to find solutions that can be reasonably adapted in the specific domestic conditions, and constantly learn and improve.

In the author's opinion the universities from the USA and UK that are the best in the rankings should not be seen as an ideal but as a kind of benchmarks on the way to own perfectness, the perfectness that would be adjusted to the specific conditions and possibilities in which the universities from Eastern European countries operate. Paraphrasing the words by Dwight D. Eisenhower deemed to be a dogma in the management sciences that "the plan is nothing, planning is everything", it can be said that "perfectness is nothing, improvement is everything".

2. University value concept from the point of view of various groups of stakeholders

A lot has been written about value. Value can be defined in a number of ways, depending on the perspective. As Rev. Stanisław Kowalczyk said "The concept of value is used in mathematics, economics, ethics, aesthetics, sociology, religion and philosophy" (Kowalczyk 1986: 38). The theories of value presenting philosophers' viewpoints say: value depends on the subjective states of human beings and other sentient creatures. It means that certain things and states are valued as long as they are a source of pleasure, are desirable or preferred (the subjective theories of value). Value can be categorised according to the states of individual sentient creatures, but at the same time good depends on what is desirable or valued by people. It means that for example knowledge, achievements and recognition are good regardless of the pleasure and satisfaction they bring. The objective

theories of value say that some things and states can be valuable regardless of their influence on the states of mind (New World Encyclopedia 2016).

Evaluation that always assumes certain criteria and hierarchy of values is an important component of every single field of knowledge; it may lead to making right or utilitarian assessments and from the philosophical point of view it is defined as “making assessments, or formulating assessing judgements that present an approval or disapproval of a given status quo, phenomenon, occurrence or behaviour (conduct) from a certain point of view and in a certain scope” (Encyklopedia PWN 2019).

What an economics finds to be a value is a feature of things that is assessable in monetary terms and seen as more or less desirable or useful. The assessment of value is done in reference to goods and economic phenomena (Bartkowiak 2008; 24). An ethicist will think of ethical and moral values (Osborne 1934/2016), a manager of, for instance, the value of human capital (Smith, Parr 2005; Berzkalne, Zelgalve 2014; Wiederhold 2014), and teaching and learning specialists of educational value (Conrad, Serlin 2006; Schierenbeck 2012; Waks 2016). Value can be examined in quantitative terms (e.g. price, the speed of service) or in qualitative terms (e.g. design, customer experience).

Hence, considering such a large number of concepts, perspectives and definitions, what should one see as a value of a university? Can it be assumed together with V.A. Zeithaml that there are four ways of understanding value also in respect of universities: “value is low price”, “value is the thing that is expected from the product”, “value is the quality that I receive for the price I pay” and “value is the thing that I receive in exchange of what I give” (Zeithaml 1988)?

Looking at value from a different viewpoint, a value of a university is “an opportunity of prolonging own mission, own activity in different spheres of human life. A graduate who will proudly talk about own university, proudly transferring that recollection to family, social and professional spheres is priceless for the university. Therefore, the value of a university is not measured by people, doctorates and computers, but by immeasurable attributes: certain people’s respect, trust and devotion, which are among the oldest of its values” (Krasuska-Korzeniec 2003). Such a way of understanding the value makes the feature very difficult to measure, if its measurement is possible at all (Broadbent 2010; Girdzijauskaite et al. 2019).

The value of a university can be measured by using the following lenses: financial impact, place-based impact assessment and the total value approach (Naylor 2016: 27-28). The financial impact can be assessed with the use of a number of quantifying methods and methods measuring various streams of spendings (personnel costs, etc.) and also their indirect and induced influence. Universities attract a lot of students hence what can additionally be measured is what their money is spent on in the local economy: accommodation, restaurants and shops. A combination of the two methods of financial influence is most frequently applied. The place-based impact assessment is the assessment of how a university influences the city/town and the area it is located in. There are a lot of positive consequences of having a university in the vicinity, such as an improved image of the city/town, increased movement and an intensified feeling of revival. Moreover, there are also advantages deriving from the rental of real estate, more shops and their higher turnover, more jobs, less crime and higher safety. Such results are interesting for local financial institutions, but the method is the least frequently used of all because the indicators are less clear and more complex, and require long-term research. On the other hand, the total value approach comprises methods which attempt to incorporate a financial value into things that lack a clear financial value, such as well-being, learning, and cultural enrichment. Clearly, it is attempted to define for instance social and educational advantages in quantity terms. Both the cost-advantage approach (Näslund et al. 2006; Raval, Gronroos 1996) and the total value approach try to show that the final monetary value is an exchange between the costs incurred and the advantages gained. These can be the unused values, such as the university passive-use value (e.g. people simply value the fact of having a university in their neighbourhood; even if they do not study at

it, they do appreciate the fact that others have such a possibility or that they (or their children, grandchildren) will have such an option in the future (Naylor 2016: 27-29).

The value of university education can also be viewed in various categories: longer lifespan, freedom, social mobility (Schlissel et al. 2018) or honesty, care and inclusion (The Value Proposition's Double Meaning 2019) or added value (Coates 2008).

When discussing the issue of the value of universities from the viewpoint of various groups of stakeholders one needs to say that the circle of stakeholders that are in direct or indirect relation with higher education institutions (Minkiewicz 2003: 9; Benneworth, Jongbloed 2010; Marshall 2018) is much wider than in the case of other organisations (Fazlagić 2012: 187) due to the number of private and social elements connected with teaching, including teaching at a higher education level (Wilkin 2009: 88).

The issue of the value of a university from the point of view of stakeholders was described by Mark Allen (Allen 2019), and Agnieszka Piotrowska-Piątek identified the stakeholders of higher education institutions. What is especially interesting is the research done by Piotrowska-Piątek, because it made it possible to distinguish 22 categories of external stakeholders of universities. The most frequently mentioned categories were: employers, representatives of the economy, local government authorities and labour market institutions (Piotrowska-Piątek 2016: 89). Additionally, each category of stakeholders was placed on the so-called map of stakeholders which shows that respondents (vice-chancellors of higher education institutions) were included the following into the strategic group of stakeholders: the Polish Accreditation Committee (PKA), the Minister of Science and Higher Education (MNiSzW) and students (Piotrowska-Piątek 2016: 90-91).

As for the internal stakeholders, there are not so many discrepancies owing to the fact that the majority of authors mention three main groups: management, staff and trade unions.

Higher education institutions are a special type of organisations the product of which is not a material article but a service comprising multi-directional teaching of students studying at it. What is also specific is the students' requirements towards the universities that act as service providers. Among the requirements there can be "...physical changes (receiving a diploma), changes influencing the state of mind (acquiring knowledge), changes influencing the mental state (becoming more self-confident) ..." (Lipska, Bojanowska 2009: 132). Moreover, the requirements or expectations of other stakeholders, such as employers, parents, society, the government, etc., are also specific. Therefore, the measurement of the value of a university needs to take into account various perspectives and take advantage of a number of measures. The measures constituting the value for various groups of organisation stakeholders have been described by M. Leśniewski (Leśniewski 2011: 113).

This paper focuses on the measures of setting university value that are measurable. The selection of the topic derives from the fact that the evaluation of universities can be very difficult and subjective from the viewpoint of various groups of stakeholders.

3. Objective measures of setting value

M. Kwiek said that "the world of academic science (national and international alike) became fully measurable during the last decade, and the achievements of prestigious scientific production became highly visible. (...) The age of indicators and quantification in creating a scientific policy has come. What has also come is measuring scholarly productivity (by publications) and scholarly impact (by citations). All in all, what we are observing now is governance by indicators, in other words the management of the system of science (and at the same time scientists) by indicators" (Kwiek 2018).

The aforementioned opinion is not among those that agree with such the measurable approach to scholars and universities' achievements; nonetheless, it cannot be said that the quota approach lacks sense. From the point of view of strategic management, the quantification makes the task easier and lets scholars more objectively analyse, process and use the data obtained. As Ł. Sułkowski notes in relation to the existing paradigms of strategies, "the strategy of an organisation is not usually an implementation of a plan based on hard data, but more a social game of the organisation success accomplished in conditions of complexity and uncertainty. However, it is important to avoid the said "oversocialised" image of an organisational strategy. Questioning the complete rationality in strategic management should not mean that an assumption of a complete irrationality is accepted" (Sułkowski 2008: 39-41).

Therefore, the selected criteria assessed in international rankings of universities published every year have been deemed to be the measurable/objective (Austen, Kotas 2016) factors this paper focuses on.

Just like it is possible to be sceptic and hostile (Hazelkorn 2007) towards the rankings and detailed factors and the manners of their assessment (Dill, Soo 2005; Griffith, Rask 2007; Salmi, Saroyan 2007; Hazelkorn 2008; Van Vught 2009), the use of measurable data published in the rankings seems to be logical, especially considering the fact that the rankings unquestionably have made crucial contribution by focusing on transparency (Marginson 2009; Van Vught, Ziegele 2012). Assuming that some data is reliable and measurable enough to make the benchmarking of universities possible, a set of factors that can be attained from those rankings has been used further in the study of the value of public higher education institutions. The descriptions of obtaining and processing those data are found in the methodologies of each of the rankings.

The precursor of world rankings of universities that classifies scientific and research achievements attained by universities is said to be the Academic Ranking of World Universities (ARWU), which has been publishing its findings since 2003. The methodology of the ranking promotes universities that stand out thanks to their scientific perfectness measured by, for instance, the number of Nobel Prizes granted, which is to the disadvantage of the humanist and technical disciplines. It also lacks factors that would assess the quality of teaching or the conditions of studying (ARWU 2018).

Owing to the lack of data for 2019 that has been accepted as the basis of the research done, the criteria assessed in that ranking have not been taken into account in the analysis of the value of universities.

The Quaquarelli Symmonds World University Ranking (QS), which was published from 2004 to 2009 in cooperation with The Times and later as an independent ranking, assessed 1,000 universities from all over the world in 2019. The top 50 comprised: 19 universities from the USA, 8 from the UK, 5 from Australia, 3 from Canada, 3 from China, 3 from Hong Kong, 2 from Singapore, 2 from Japan, 2 from South Korea, 2 from Switzerland and 1 from France. The same as in the case of ARWU, in the QS ranking the universities from Eastern Europe are placed far behind, with the best places taken by Charles University in Prague (317 position) and University of Warsaw - 394 positions; the worst rates were given to universities from Bulgaria and Romania (places from 801 to 1000). The objective criteria of the QS ranking that have been selected in the measurement of the value of universities are as follows: Faculty/Student Ratio - F/SR, International Faculty Ratio - IFR, International Student Ratio - ISR (QS 2019).

As the authors of the next ranking, which started to be published in 2004, assure, "Webometrics is a ranking of all universities in the world, not only a few hundred of institutions from the developed countries" (Webometrics 2019). There were about 12,000 universities from all over the world assessed in the Webometrics ranking (January 2019), including: 54 universities from Bulgaria, 80 universities from the Czech Republic, 68 universities from Hungary, 416 universities from Poland, 103 universities from Romania, 36 universities from Slovakia, 279 universities from the UK and 3,270 universities from the USA (important for further analyses). Two factors from

the ranking have been deemed to be criteria constituting the value of universities and have been used in further analyses, i.a. Presence and Impact (Webometrics 2019).

The next ranking is the Times Higher Education World University Ranking (THE), which started publishing own findings in 2010, and in 2019 it assessed 1,258 universities all over the world. The top 50 in the ranking comprises the following: 24 universities from the USA, 7 from the UK, 3 from Canada, 3 from Germany, 2 from Switzerland, 2 from China, 2 from Australia, 2 from Hong Kong, 1 from Belgium, 1 from Japan, 1 from Singapore, 1 from France and 1 from Sweden. In the Times ranking there was 1 university from Bulgaria, 14 universities from the Czech Republic, 7 universities from Hungary, 12 universities from Poland, 7 universities from Romania, and 98 universities from the UK and 172 from the USA. It should be stressed that the universities from the Eastern European countries subject to the analysis were ranked very low. Taking into account the universities under analysis, the best score was attained by the Charles University in Prague, which took place 401-500, and the worst by the Sofia University - 1000+. The criteria selected from that ranking to measure university value were as follows: Citation and Industry Income (THE 2019).

The authors of the report titled *Assessment of Higher Education Learning Outcome* found the U-Multirank ranking to be the ranking that is currently the most significant attempt to overcome the limitations of the majority of university rankings. U-Multirank is a project “aiming at increasing the importance, scope, diversity and transparency of information about higher education” (Tremblay et al. 2012: 39). The first edition of U-Multirank was in 2014. It presented information about over 850 universities from more than 70 countries. In 2019 it was possible to compare over 1700 universities from 96 countries all over the world. Since 2018 the authors of the ranking also publish such lists as “TOP 25 Performers” in which various criteria that can be important from the point of view of different people/organisations interested in the university results are taken into account. U-Multirank does not show such combinations as “the best universities in the world/continent/country”, providing recipients with the option of selecting factors according to which the interested make their own rankings and comparisons. Two criteria found to be important for an analysis of the university value are Patents awarded (size-normalised) and Regional joint publications. From the point of view of the universities from Eastern Europe subject to the analysis, it should be said that only the Jagiellonian University, Poland, was ranked in “TOP 25 Performers” in one of the analysed categories, namely “Regional joint publications” under the “Regional Engagement” university activity dimension (U-Multirank 2019).

4. Radar charts - practical application, merits and limitations

A radar chart was first used by Georg von Mayr, a German statistician, in his work *Die Gesetzmäßigkeit im Gesellschaftsleben*, published in Oldenbourg in 1877 (Mayr 1877: 78-79). At present the use of radar (web) charts is gaining interest in various areas of management theory and practice, including organisation strategic management. The areas in which radar charts are successfully applied are: sustainable development management, university management, product management, and human resource management. Radar charts (web charts) are especially used to:

- present various criteria of sustainable development of cities, and this way make it possible to compare the sustainability levels in those cities (European Commission 2018: 13-15),
- compare profiles, strengths and weaknesses of countries and other facilities,
- present and compare the level of factors depicting universities all over the world (U-Multirank),
- present and compare products of competing companies (chocolate, cars),
- inspect the improvement of quality in order to illustrate the performance indicators of each programme in place,
- graphically evaluate the organisation in comparison with its competition or in comparison to itself (a dynamic benchmark) (Perło 2014: 84; Multan, Wójcik-Augustyniak 2016: 93-94),
- illustrate multidimensional data with descriptive statistics (Friendly 1991),

- present, compare and evaluate professional competence/ characteristics/ requirements of staff working in organisations (Filipowicz 2004: 108; Bombiak 2014: 182),
- determine the strengths and weaknesses of sports players.

A radar chart is a specific layout of axes in which several axes, the number of which is equal to the number of characteristics/ statistics/ criteria/ factors (n), start from the same point. The angles between the axes are the same and equal $360^\circ/n$ each. A radar chart is a two-dimensional chart representing three or more quantitative variables. The angle and relative position of the axes is typically uninformative (*Radar Chart* 2019).

Yet, this current uninformative nature of the angle between the axes of a radar chart can be changed into a very important data from the point of view of the measurement of the organisation value.

Radar charts require metrics, which means that all variables subject to the analysis should be expressed in numbers, but the values may differ on each axis. In the case of a description and inference on the basis of radar charts, it can be assumed that the values along the central circle represent the minimal values acceptable for each of the variables, and the external circle represents the standardized, target or ideal values of the relevant variables/ products/ cities/ organisations/ people.

Despite such a wide array of applications, radar charts are also criticised because “in the case of the majority of data the charts are not effective, since it is not possible to easily compare the data when the frames form criss-cross” (Czapiewski 2010). This radial nature places a particular emphasis on the high values along the external ring on the chart. If there are any zero values, the chart may be very difficult to interpret (Odds 2011). A radar chart is not suitable for organising data either. The critics of radar charts claim that they are “nothing else but a line chart with the category scale in the form of a circle” (Czapiewski 2010).

Various areas in which radar charts can be applied mainly focus on a graphic presentation of certain phenomena subject to analysis. However, have they already been used to compare the value of an organisation? The author suggests applying radar charts to measure and compare the value of organisations by the case of universities. For the purpose of this paper it has been also assumed that the measurement of the value of higher education institutions can be made on the basis of various factors (criteria).

5. Methodology

This paper attempts to use radar charts as a tool supporting the measurement and comparison of the value of organizations, such as higher education institutions. The research question is the following: How can radar charts be used to measure and compare the value of organisations? The hypothesis formulated assumes that radar charts can be used in various areas of analysing the value of organisations, including:

- to measure the value of organisations (dynamic);
- to make multi-criteria comparisons of organisations;
- to evaluate organisations from the point of view of various groups of stakeholders.

In this case the charts serve as an illustration of the methodology of actions taken to measure the value of an organisation.

In the paper 11 universities from 6 Eastern European countries and 1 public university from the UK and 1 public university from the USA, which served as benchmarks, were subject to a comparative analysis. According to the World Population Review (2019), there are 9 countries constituting Eastern Europe, these are: Ukraine, Poland, Romania, the Czech Republic, Hungary, Belarus, Bulgaria, Slovakia and Moldova, and according to the statistical classification Eastern Europe comprises the Russian Federation apart from the countries listed above

(United Nations 2019). For the purpose of this study, only universities located in countries that are members of the European Union have been taken into account. Therefore, the research refers to universities in Poland, Romania, the Czech Republic, Hungary, Bulgaria and Slovakia.

Only public universities were selected for the benchmarking and those institutions that were found in all rankings taken into account in the paper, namely QS, The Times, U-Multirank, and Webometrics. The criteria adopted to compare the universities were only those from the relevant rankings that were measurable (objective) indicators, not experts' assessments/opinions, namely: Faculty/ Student Ratio, International Faculty Ratio, International Student Ratio, Citation (research influence), Industry income, Patents awarded (size-normalised), Regional joint publications, Presence (number of webpages), and Impact (number of external networks).

The analysis of the value of universities can be thematic - teaching, science, knowledge transfer, etc., or general - the value of universities as such. Given the fact that universities from not all countries of Eastern Europe could be found in the relevant rankings in thematic sections, only a general comparison of the universities was made, without any division into scientific fields or disciplines.

The research done with the use of radar charts and formulas for calculating the surface area of irregular polygons let the author carry out the measurement of the value and a comparative analysis of selected universities, and draw conclusions on that basis.

Table 1. Numerical ranges and corresponding levels of the studied factors (criteria)

Level	Ranges for:				
	Faculty/ Student Ratio (F/SR)	International Faculty Ratio (IFR), International Student Ratio (ISR)	Citation, Industry Income, Patents awarded (size-normalised), Regional Joint Publications	Presence	Impact
1	20.1-25.0	0-12.0	0-20	3201-4000	2401-3000
2	15.0-20.0	12.1-24.0	21-40	2401-3200	1801-2400
3	10.1-15.0	24.1-36.0	41-60	1601-2400	1201-1800
4	5.1-10.0	36.1-48.0	61-80	801-1600	601-1200
5	0-5.0	48.1-60.0	81-100	0-800	0-600

Source: own elaboration

Table 1 presents numerical ranges and the corresponding levels of the studied factors (criteria) that have been taken into account in the measurement and comparison of the value of organisations (universities). Allocating individual values to respective ranges (e.g. on a five-point scale from 1 to 5) let the author make the values of the factors (criteria) uniform on the radar chart axes. The necessity of the normalisation resulted from the fact that each factor (criterion) was calculated with different variables, for instance F/SR according to formula "Numbers of students in total/Numbers of employees in total"; IFR according to formula "Numbers of foreign employees/Numbers of employees in total" and ISR according to formula "Numbers of foreign students/Numbers of students in total". Citation, Industry Income, Patents awarded (size-normalised), and Regional Joint Publications are expressed in percentage values quoted in the rankings, factor Presence is measured as size (number of webpages) of the main webdomain of the institution. It includes all the subdomains sharing the same (central or main) webdomain and all the file types including rich files like pdf documents. Factor Impact shows the Number of external networks (subnets) originating backlinks to the institution's webpages. After the normalization, the average value between the two sources is selected (QS, THE, U-Multirank, Webometrics 2019).

Taking into account the ranges is especially significant for the purpose of unifying the values of such factors (criteria) as Faculty/ Student Ratio, Presence and Impact owing to the fact that in their case lower values are ranked higher than higher values.

Table 2 shows example values of analysed factors (criteria) according to the division into the minimal level, the real level of the relevant organisation, and the maximal level, important as far as the comparison of values of various organisations is concerned, and for inference about gaps in the levels of factors (criteria) in relation to the optimal, target and planned values.

Table 2. Example values of relevant factors (criteria) according to the division into the minimal level, real level of a given organisation and maximal level

Detailed list	F/SR	IFR	ISR	Citation	Industry Income	Patents awarded (size-normalised)	Regional Joint Publications	Presence	Impact
Minimal factor (criterion) level	1	1	1	1	1	1	1	1	1
University X	3	2	4	2	2	2	2	5	5
Maximal factor (criterion) level	5	5	5	5	5	5	5	5	5

Source: own elaboration

A radar chart consisting in a few variables (factors/criteria) makes it possible to continue with the next stages of the measurement of value thanks to a graphic presentation of the number of sides and angles between sides resulting in the formation of an irregular polygon that is the basis for calculating the value of an organisation (Fig. 1).

In order to calculate the value of organisations, the formula for calculating the surface area of irregular polygons, which in this case is rather the formula for calculating the surface area of irregular triangles, the number of which depends on the number of sides/angles of the polygon, was used. The formula has been presented below (Matematyka 2019):

$$P_{\text{area}} = \frac{1}{2} \times \sin \alpha \times (axb + bxc + cxd + dxe + exa),$$

assuming that the polygon is a pentagon. Depending on the number of angles, there will be a hexa-, hepta-, octa-, nona-, or n-gons, and thus the number of sides that will be taken in the calculations will respectively change. Nonetheless the rule is the same.

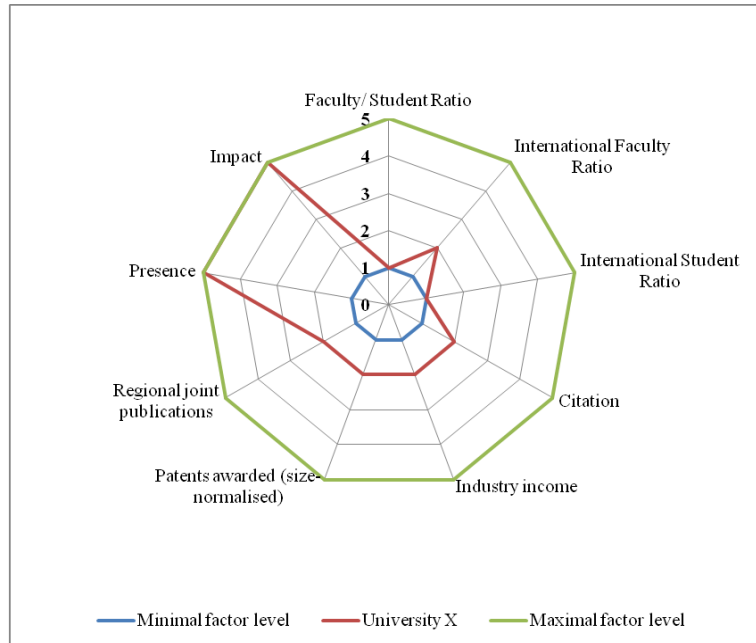


Fig. 1. Radar chart taking into account the values of relevant factors (criteria) according to the division into the minimal level, real level of a given organisation and maximal level

Source: own elaboration

However, it should be said here that to measure the value of organisations with the formula for the surface area of irregular polygons taking into account fewer than 5 and more than 12 factors (criteria) is not recommended. For the purpose of further calculations it has been assumed that the maximal length of the sides (a, b, c, d, ...) is 5.

With the assumption that the maximal length of the sides is 5 and the number of angles (variables/criteria) 9, the maximal surface area (value) will be:

$$\begin{aligned}
 a &= b = c = d = e = f = g = h = i = 5 \\
 \alpha &= 360^\circ/9 = 40^\circ \\
 \sin 40^\circ &= 0,6427876 \\
 P &= \frac{1}{2} \times \sin \alpha \times (axb + bxc + cxd + dx e + exf + fxg + gxh + hxi + ixa) \\
 P &= \frac{1}{2} \times 0,6427876 \times (5 \times 5 + 5 \times 5 + 5 \times 5 + 5 \times 5 + 5 \times 5 + 5 \times 5 + 5 \times 5 + 5 \times 5 + 5 \times 5) = 72,315
 \end{aligned}$$

The data found in Table 3 present values of selected measurable factors (criteria) obtained from four 2019 ratings (QS, THE, U-Multirank, Webometrics) for 13 universities taken into account in the analyses. They are the basis of the next stages of the process of measuring university value. The stage that follows is the allocation of each value of the factors (criteria) to appropriate ranges on a five point scale from 1 to 5. As a result of that procedure the data presented in Table 4 has been obtained.

Table 4 contains also the sums of individual factors and their values according to the formula for the surface area of an irregular polygon. The data presented shows that the highest value calculated on the basis of the analysed factors (criteria) was attained in 2019 by a public university from the UK, namely the Imperial College London, and amounted to 51.745. Despite being the highest, the value constituted about 72% of the maximal value. On the other hand, the lowest value, 5.785, was attained by a university from Romania - the West University of

Timișoara. The result made up less than 8% of the maximal value. Considering the universities from the Eastern European countries, the highest value amounting to 23.462 (about 32% of the maximal value) was attained by 2 universities from Hungary and the Jagiellonian University from Poland.

Table 3. Values of selected measurable factors (criteria) from four 2019 rankings for analysed universities

University	Country	F/SR	IFR	ISR	Citation	Industry income	Patents awarded (size-normalised)	Regional joint publications	Presence	Impact
Sofia University	Bulgaria	11.61	0.48	5.47	12.6	35.2	0	51.6	67	1380
Charles University in Prague	Czech Republic	10.58	8.83	17.22	55.9	34.4	0.25	39	143	238
Masaryk University	Czech Republic	16.38	10.36	23.28	34.6	35.1	0.32	26.5	83	395
Eotvos Lorand University	Hungary	16.15	1.89	9.08	44.5	35.5	0	60.5	31	596
University of Szeged	Hungary	8.92	7.52	19.45	41.2	37.3	0.65	22	577	720
Alexandru Ioan Cuza University	Romania	21.9	3.16	6.13	12.9	34	0	42.5	1669	1419
West University of Timișoara	Romania	18.68	0.27	4.48	20.1	34.3	0	23.8	3399	2919
Comenius University in Bratislava	Slovakia	11.31	0	9.62	22.8	36.4	0	30.6	358	1175
Slovak University of Technology in Bratislava	Slovakia	10.14	1.35	2.94	9.9	36.5	0	31.7	361	1548
University of Warsaw	Poland	11.27	4.79	7.76	44.7	34.2	0.25	37.3	440	353
Jagiellonian University	Poland	9.34	2.49	6.59	50.7	34.8	0.5	28.6	349	506
Imperial College London	UK	4.32	54.08	55.93	97.8	67.3	6.74	25.8	658	134
University of California, Berkeley	USA	14.44	49.44	16.83	99.7	49.3	67.32	23.8	109	4

Source: own elaboration

Table 4. Level of selected measurable factors (criteria), their sum and value for the analysed universities in 2019

University	Country	F/SR	IFR	ISR	Citation	Industry income	Patents awarded (size-normalised)	Regional joint publications	Presence	Impact	Total	Value
Sofia University	Bulgaria	3	1	1	1	2	1	3	5	3	20	16.391
Charles University in Prague	Czech Republic	3	1	2	3	2	1	2	5	5	24	22.819
Masaryk University	Czech Republic	2	1	2	2	2	1	2	5	5	22	19.605
Eotvos Lorand University	Hungary	2	1	1	3	2	1	4	5	5	24	23.462
University of Szeged	Hungary	5	1	2	3	2	1	2	5	4	25	23.462
Alexandru Ioan Cuza	Romania	1	1	1	1	2	1	3	3	3	16	9.963

University												
West University of Timișoara	Romania	2	1	1	2	2	1	2	1	1	13	5.785
Comenius University in Bratislava	Slovakia	3	1	1	2	2	1	2	5	4	21	17.998
Slovak University of Technology in Bratislava	Slovakia	3	1	1	1	2	1	2	5	3	19	14.463
University of Warsaw	Poland	3	1	1	3	2	1	2	5	5	23	21.534
Jagiellonian University	Poland	4	1	1	3	2	1	2	5	5	24	23.462
Imperial College London	UK	5	5	5	5	4	1	2	5	5	37	51.745
University of California, Berkeley	USA	3	5	2	5	3	4	2	5	5	34	38.568
Maximal value		5	5	5	5	5	5	5	5	5	45	72.315

Source: own elaboration

6. Applying radar charts to measure and benchmark the value of universities

As already mentioned, it is assumed in the paper that radar charts can be used in various areas of the analysis of the value of organisations, including:

- to measure the value of organisations, also in the dynamic perspective;
- to make multi-criteria comparisons of organisations;
- to evaluate organisations from the point of view of various groups of stakeholders.

6.1. Applying radar charts to measure the value of organisations, including the dynamic perspective

Radar charts can be applied to measure the value of a single organisation according to an array of factors (criteria). Hence, the 2019 value of the Jagiellonian University, as a case of a public higher education institution, amounting to 23.462, calculated according to the presented formula for the surface of an irregular polygon, can be illustrated in the manner seen in Fig. 2.

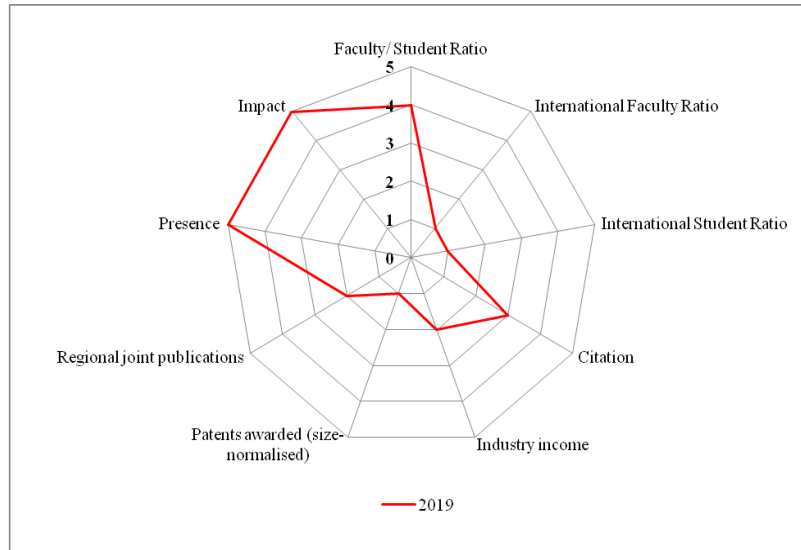


Fig. 2. Value of the Jagiellonian University in 2019

Source: own elaboration

Considering the dynamic comparison, the value of the Jagiellonian University changed over time (2016 and 2019) in the way depicted in Table 5 and in Fig. 3.

Table 5. Value of the selected university in 2016 and 2019

Jagiellonian University	F/SR	IFR	ISR	Citation	Industry income	Patents awarded (size-normalised)	Regional joint publications	Presence	Impact	Value
2016	1	1	1	2	2	1	2	5	5	16.713
2019	4	1	1	3	2	1	2	5	5	23.462

Source: own elaboration

The data presented in Table 5 show that the value of the Jagiellonian University significantly increased over the 4 years. Only two factors influenced that fact: Faculty/Student Ratio, which went up from level 1 to level 4, and Citation, which went up from level 2 to level 3.

However, it should be pointed out that the falling number of students per employee (F/SR) was not necessarily intended by the university authorities but it was rather a consequence of a decreasing number of the total number of candidate students and students in Poland (Statistics Poland 2019)

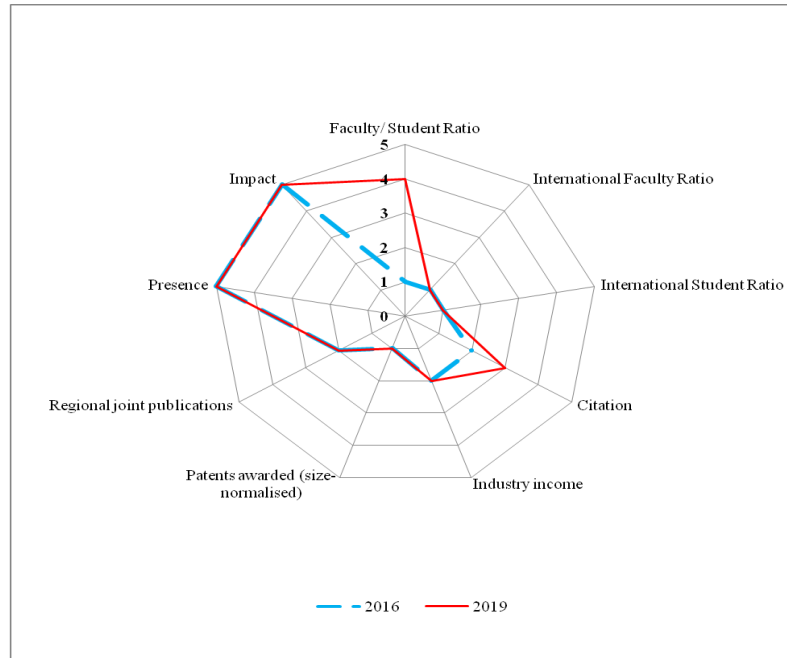


Fig. 3. Dynamic comparison of the value of the Jagiellonian University in 2016 and 2019

Source: own elaboration

6.2. Applying radar charts to multi-criteria comparisons of organisations (universities)

Radar charts make it possible to compare the value of all analysed public universities (Fig. 4). Nonetheless, the presentation of the results of the comparisons in a single figure is not a good move. As the illustration shows, a large number of organisations (universities) subject to the comparison leads to an unclear image and it cannot be the basis for drawing appropriate conclusions, which has already been indicated by critics of those charts.

Such a way of presenting the value of organisations only lets us identify the factors (criteria) that are at the same level in the case of each of the universities.

Hence in the majority of the relevant universities the following factors constituting university value are at a comparable (or the same) level: International Faculty Ratio, Industry Income, Patents Awarded (size-normalised) and Presence. On the other hand, strong differences are visible in the case of such factors as: Faculty/Student Ratio, International Student Ratio, Citation, Regional Joint Publications and Impact.

Such a comparison permits managers/university authorities to make decisions about the areas to which they should devote their efforts in the future.

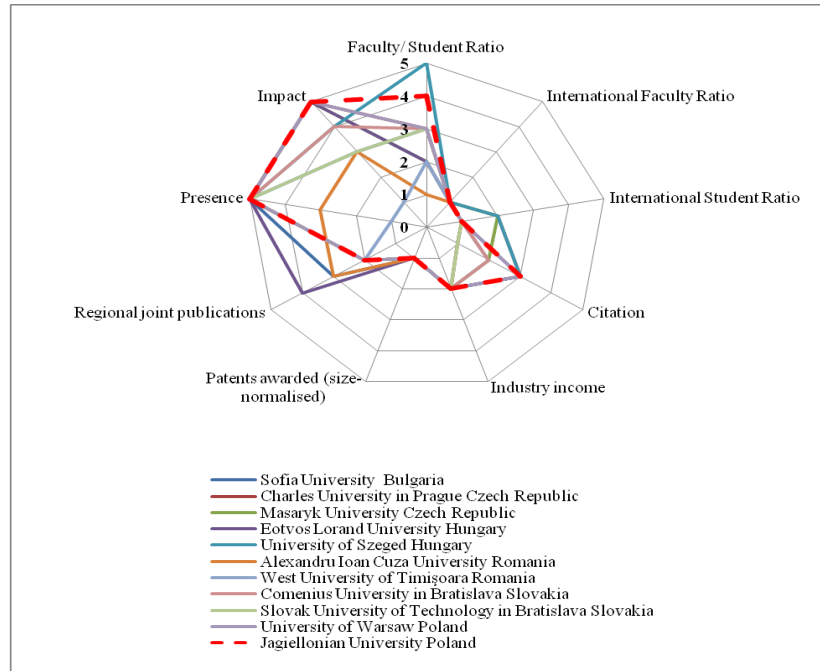


Fig. 4. Comparing the value of analysed universities in terms of the level of the selected measurable factors (criteria)

Source: own elaboration

Radar charts may also serve to compare the value of organisations (universities) from the same country (Fig. 5). To illustrate that functionality, two best Polish public universities have been chosen, namely the University of Warsaw and the Jagiellonian University.

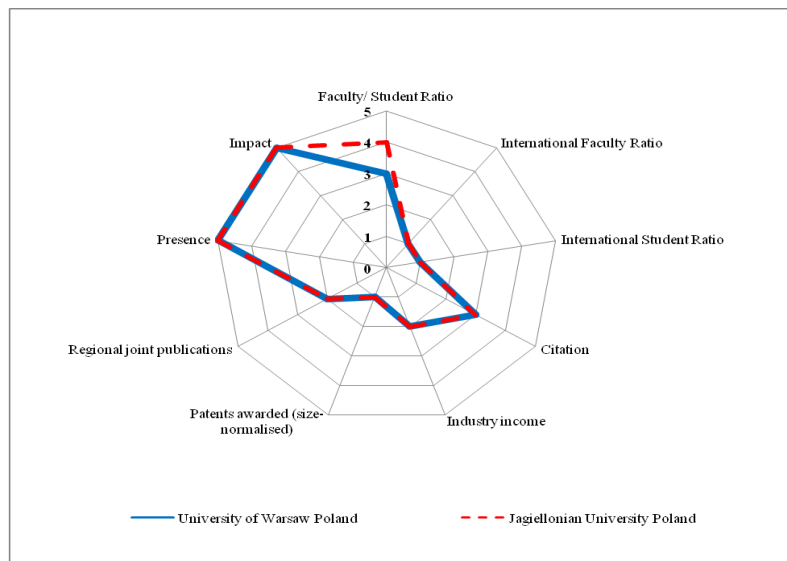


Fig. 5. Comparing the value of selected universities from the same country

Source: own elaboration

The data shown in Fig. 5 indicates that in 2019 the value of the Jagiellonian University was higher than the value of the University of Warsaw. The reason for that was a higher level of Faculty/Student Ratio in the case of the Jagiellonian University than the University of Warsaw. What the University of Warsaw should do to improve the rate is either increase the number of university staff members or reduce the number of students taken.

Radar charts can be also applicable to comparing the value of universities with those that are treated as benchmarks. In this case a Polish public university (the Jagiellonian University) has been compared with public universities from the USA (the University of California, Berkeley) and the UK (the Imperial College London).

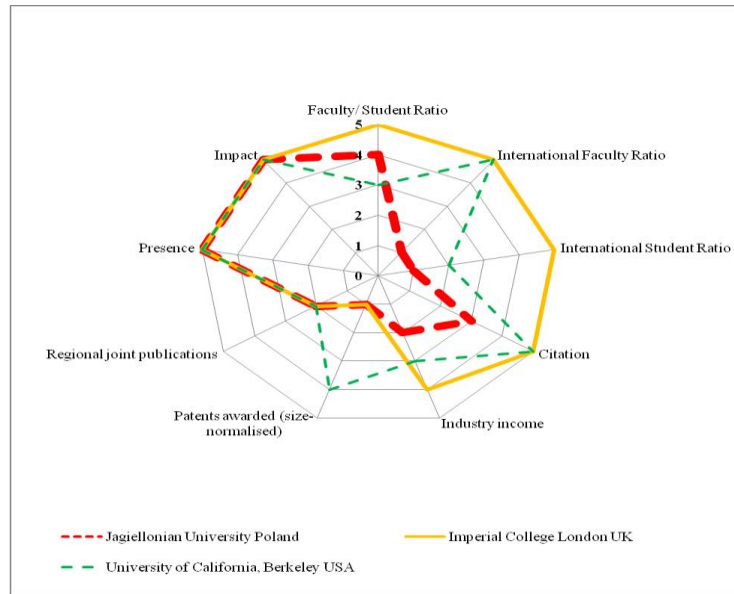


Fig. 6. Comparing the value of the Jagiellonian University with the benchmarks

Source: own elaboration

As Fig. 6 shows, the Jagiellonian University significantly diverges unfavourably from the benchmarks considering such factors (criteria) as: International Faculty Ratio, International Student Ratio, Citation and Industry Income. On the other hand, the following factors are at a much the same level: Regional Joint Publications, Presence and Impact.

On the basis of the comparative analysis done, it is concluded that the biggest weakness of the Jagiellonian University (and the majority of public universities in Poland) is the low level of internationalisation, research and knowledge transfer. These factors contribute to the low value of universities in Poland most.

6.3. Applying radar charts to evaluate organisations (universities) from the viewpoint of various groups of stakeholders

For the purposes of the research, pilot studies in one of the groups of university stakeholders were carried out. The pilot studies were aimed at: verifying the opinion on the correctness of the research tool that will be used in the relevant research; verifying the level of understanding of the research tool; and obtaining an opinion on the importance of selected factors creating the value of universities.

A simplified expert method was applied in which academic teachers were recognized as experts. The research was conducted using a structured interview. 16 academic teachers, including 9 women and 7 men, took part in the research. The most numerous group consisted of people with the academic degree of doctor (13 persons) and habilitated doctor (1 person), who were research and teaching staff (14 persons). Academic teachers with Master's degrees (2 persons) were teaching staff. The largest group consisted of people aged 35-44 (10 persons), 3 experts were either under 34 or over 45, with seniority of mostly 11 to 20 years (9 persons). 10 out of the 16 examined academic teachers do not hold managerial functions at the university, but take part in international (6 persons) and national (3 persons) programs. Half of the experts give lectures/classes in a foreign language, cooperate with industry partners and have publications with partners from the country (7 persons), from abroad (4 persons), from industry (2 persons), and from the region and public administration (1 person). It should be noted that some people declared cooperation with several types of partners. 15 out of 16 teachers, said they had not obtained any patents.

Considering the average weights of individual factors (criteria) that were proposed by academic teachers (Fig. 8), one may state that 'Citation' and 'Patents awarded (size-normalized)' are most important, and 'ISR' and 'IFR' are least important. It should be added that the average weights of individual factors (criteria) differed depending on the academic teachers' age (Fig. 7) and gender (Fig. 8).

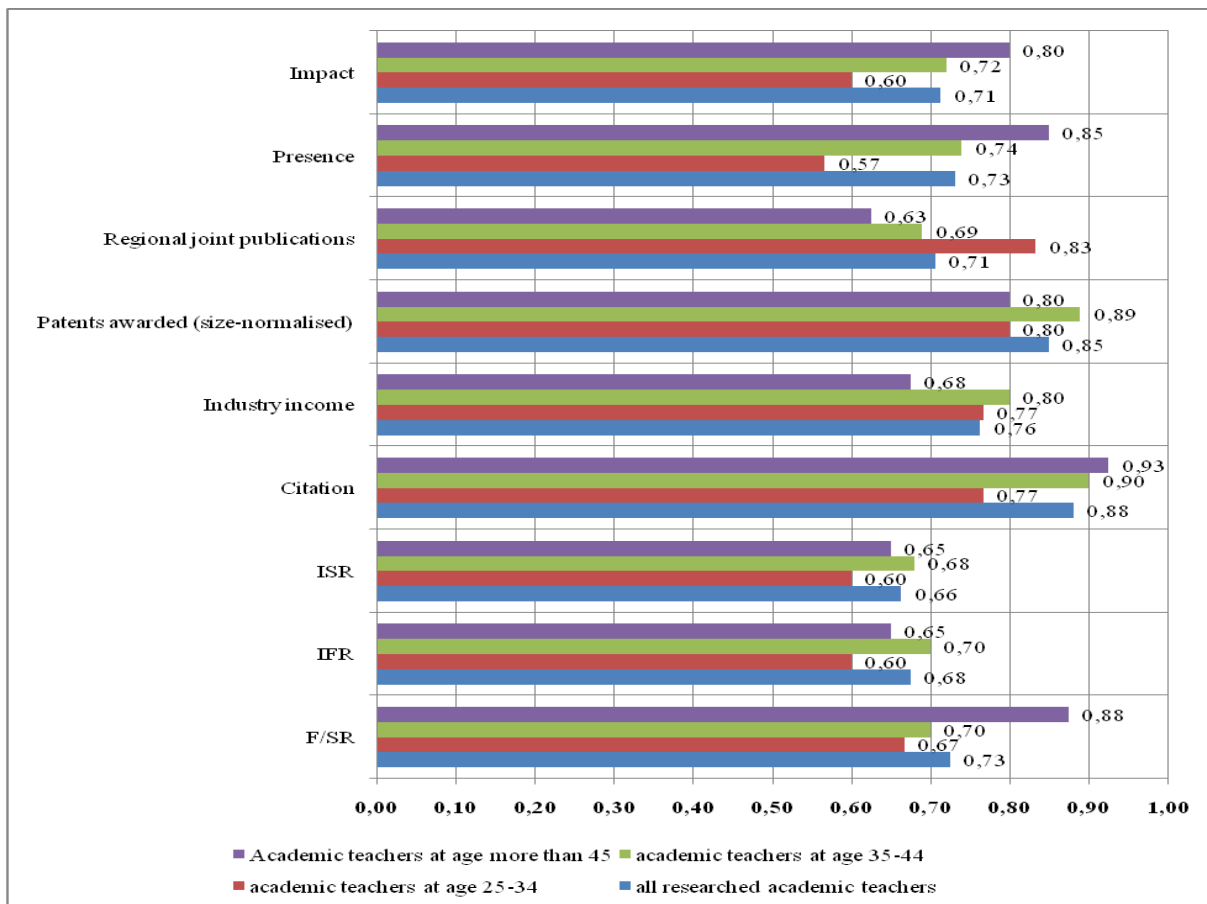


Fig. 7. Average weights of individual factors (criteria) depending on academic teachers' age.

Source: own elaboration

The data contained in Fig. 7 show that in the opinion of the youngest group of academic teachers, most of the analysed factors (criteria) constituting the value of a university are of low value as the group rated these factors relatively low. Academic teachers from the 35-44 age group rated 'IFR', 'ISR', 'Industry Income' and 'Patents awarded (size-normalized)' the highest of all age groups, while academic teachers from the age group over 45 attributed the highest rating to the following factors (criteria): 'F/SR', 'Citation', 'Presence' and 'Impact', and the lowest ratings to: 'Industry income', 'Patents awarded (size-normalized)' and 'Regional joint publications'.

Fig. 8 shows differences in academic teachers' opinions according to gender.

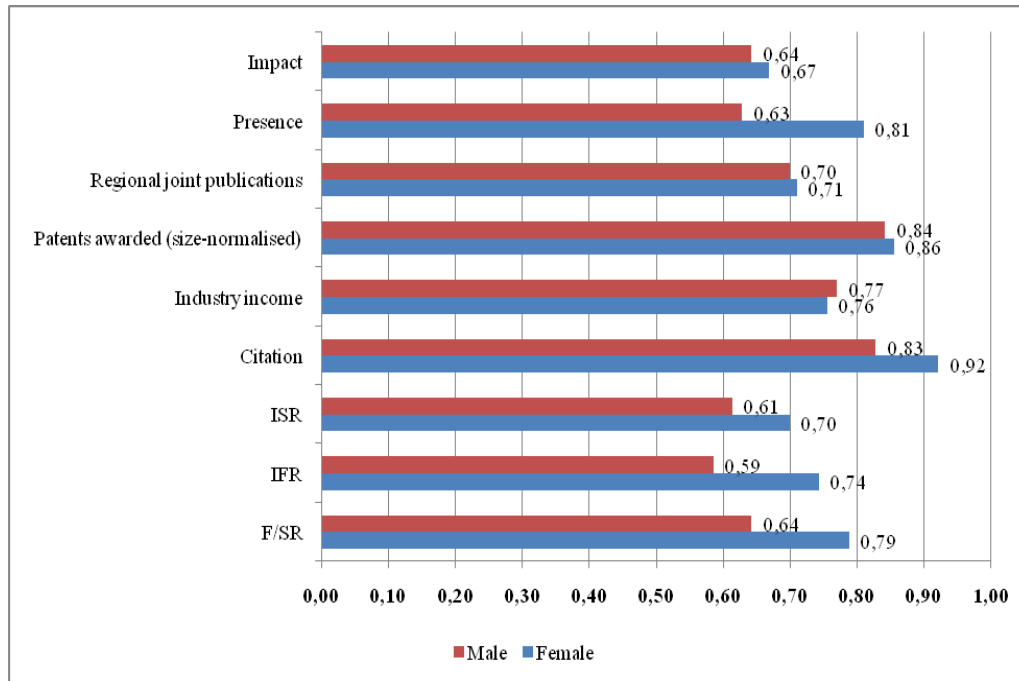


Fig. 8. Average weights of individual factors (criteria) depending on academic teachers' gender.

Source: own elaboration

As observed in Fig. 8, female teachers valued the majority of the studied factors (criteria) higher than male teachers. From the point of view of all teachers, 'Citation' and 'Patents awarded' were the most valued factors; from the viewpoint of both genders, it was 'ISR' that was the factor of the lowest value; women rated 'Impact' (0.67) lowest and in the case of men the lowest rating was obtained by 'IFR' (0.59).

The distribution of weights of selected factors creating the value of universities differ also depending on the position academic teachers hold at the university (Fig. 9).

It can be observed that academic teachers holding managerial positions rated 'Citation' highest while non-managerial teachers found 'Patents awarded' as the most important criterion. 'Citation' is nowadays one of the most important factors for all academic teachers in Poland because of the intense pressure on academic staff for publications in the best and highest indexed international journals. It is connected with government policy which requires improving scientific impact of academic staff from higher education institutions.

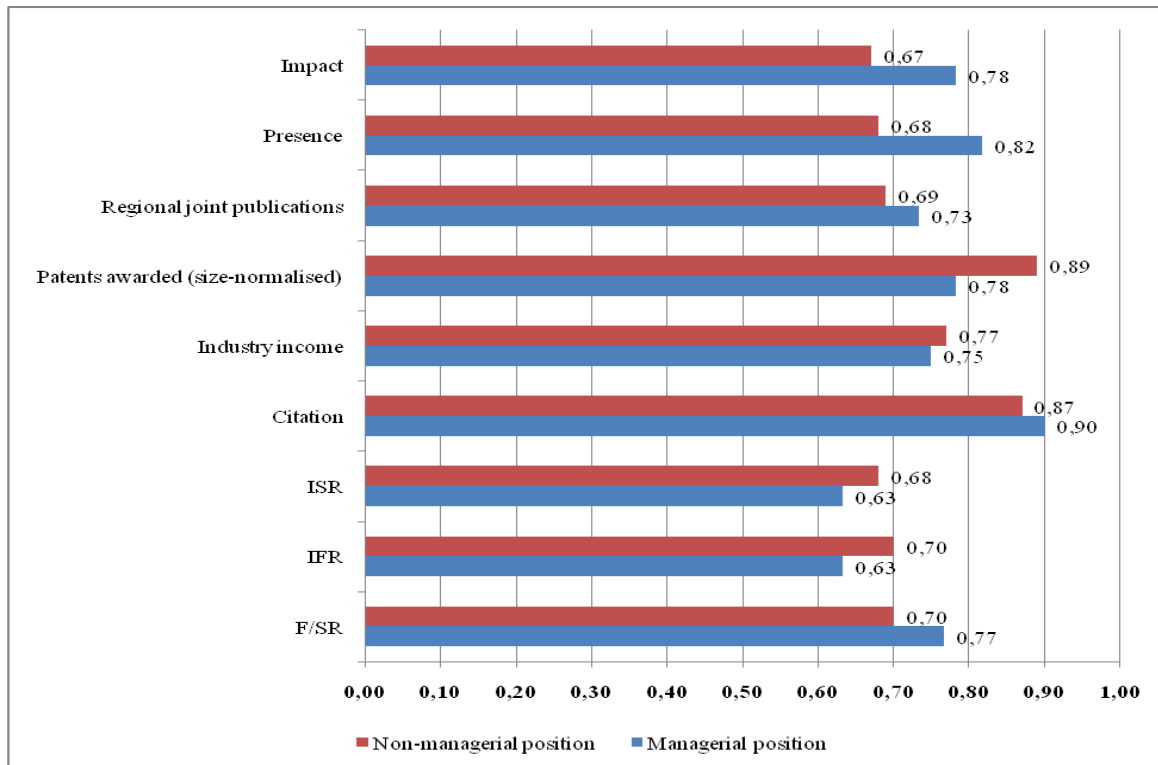


Fig. 9. The average weights of individual factors (criteria) depending on the position of academic teachers at the university (managerial/non-managerial).

Source: own elaboration

Taking into consideration all evaluated factors (criteria), one should conclude that the least important factors for academic teachers holding managerial positions appear to be those related to the internationalization of universities' teaching activity. Numerical indicators describing the ratio of the number of foreign students to total students (ISR) and foreign teachers to total academic teachers (IFR) were rated relatively low by them.

The research let us obtain academic teachers' opinions on the distribution of the weights of selected factors creating the value of universities. That allowed us to make the calculation of the value of the university on the example of the Jagiellonian University analysed in this article. The results are shown in Table 6 and in Fig. 10.

Table 6. Evaluation of factors (criteria) from the point of view of academic teachers as an example of a group of university stakeholders

Jagiellonian University	F/SR	IFR	ISR	Citation	Industry income	Patents awarded (size-normalised)	Regional joint publications	Presence	Impact	Value
Weight	0.7	0.7	0.7	0.9	0.8	0.9	0.7	0.7	0.7	-
Objective level	4	1	1	3	2	1	2	5	5	23.462
Weighted (subjective) level	2.8	0.7	0.7	2.7	0.8	0.9	1.4	3.5	3.5	12.313

Source: own elaboration

The data presented in Table 6 show the weights of chosen factors and weighted (subjective) levels of these factors. The weights represent the average arithmetic weights obtained in the conducted research.

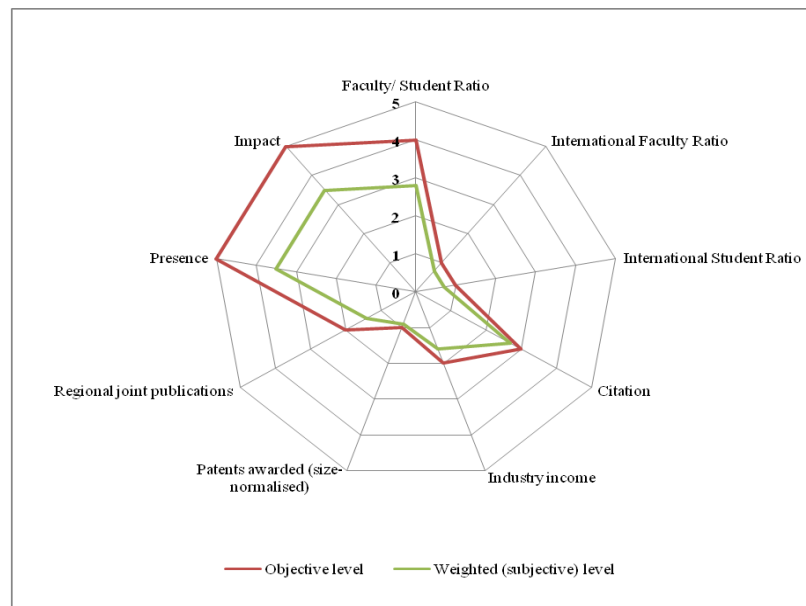


Fig. 10. The comparison of the objective value of the Jagiellonian University with the subjective (weighted) value calculated from the point of view of academic teachers as a group of stakeholders

Source: own elaboration

The data presented in the form of a radar chart (Fig. 10) clearly illustrate the differences between the objective (measurable) value of the analysed university and the subjective value of this university from academic teachers' viewpoint.

It must be clearly noted that the full research that would allow us to apply radar charts to evaluate organisations (universities) from the viewpoint of various groups of stakeholders has not been done yet. What should be done first is primary research that would make it possible to assess the weight of individual factors (criteria) for each group of university stakeholders.

The move is important due to the fact that students, employers, academic staff, university authorities, society and the country as a whole may choose different factors (criteria) that create university value for them. Moreover, they may weigh the factors differently. That is why that way of evaluating a university may lead to a completely different value.

Yet, at the present stage it is possible to say that the application of weights (e.g. according to a scale from 0 to 1) would make it possible to calculate the value of universities from the perspective of each group of stakeholders. Comparing the values of universities, calculated taking into account the weights, would illustrate the subjective value of measurable (objective) factors (criteria) that constitute that value.

It should be emphasized that for the needs of this paper, the most important task was to obtain answers to questions about the weight of individual factors (criteria) constituting the value of the university. However, no research was conducted to identify the factors that are actually the most important from the point of view of academic teachers. The article focuses on presenting and testing a tool that can be used to assess the university value, and not on a full assessment of this value from the point of view of any group of stakeholders. That is why the aforementioned assumptions on the weights of individual factors (criteria) from the viewpoint of academic

teachers are preliminary. The evaluation of universities from the point of view of various groups of stakeholders will be investigated in a separate study.

Conclusions

The research done allows us to claim that radar charts contribute to the measurement and comparison of the value of such organisations as universities. The hypothesis formulated in the introduction assuming that radar charts can be used in various areas of analysing the value of organisations has been positively verified.

The studies carried out with the use of radar charts and mathematical formulas for the surface area of irregular polygons make it possible to:

- measure the value of an organisation (university) (dynamic);
- make multi-criteria comparisons of organisations (universities) - all organisations (universities) subject to the study; organisations (universities) from the same country; an organisation (university) in comparison with the benchmarks;
- evaluate an organisation (university) from the point of view of various groups of stakeholders.

However, it is appropriate to say here that despite certain drawbacks of radar charts as such, it is possible to make the measurements and comparisons of the value of organisations (universities) objective by introducing:

- a. Levels (on a five-point scale from 1 to 5) and corresponding ranges of factors (criteria) taken into account in the analyses. Making the move lets us normalise the values along all axes of a radar chart.
- b. Weights assumed for each factor (criterion) that allow us to identify the most and least important factors (criteria) from the point of view of individual groups of stakeholders (e.g. on a scale up to 1.00). The move will make it possible to measure the value of organisations (universities) from the point of view of selected stakeholders.
- c. Limited number of organisations (universities) presented on a single chart (up to 3). The example of Fig. 4 shows that a larger number of universities would lead to an unclear chart.
- d. Limited number of factors (criteria) for comparisons (from 3 to 12). If the number of factors is too high, the chart loses transparency. In the paper it is assumed that an optimal range of the number of factors (criteria) to measure the value and compare organisations (universities) is between 5 and 12.

The research done let the author develop the following procedure of measuring the value of an organisation with radar charts and mathematical formulas for the surface area of an irregular polygon:

1. Identification of factors (criteria) constituting the value of a given type of an organisation (financial, non-financial, measurable, non-measurable, qualitative, quantitative).
2. Selection of a set of factors (criteria) that will be subject to the relevant analysis. It is possible to make a set of various types of factors (financial and/or non-financial and/or measurable and/or non-measurable and/or qualitative and/or quantitative).
3. Determination of the number of levels, e.g. from 1 to 5. It is possible to modify the number of levels, as appropriate.
4. Comparison of the real values of selected factors (criteria) for all organisations subject to the analysis (Table 3).
5. Formation of ranges corresponding with the real values of the factors (criteria) from stage 4 selected for the analyses, taking into account the number of levels determined in stage 3 (Table 1). Stages 4 and 5 can be applied interchangeably, depending on the purpose of the research done.
6. Transformation of the real values of selected factors (criteria) into the levels corresponding to them (Table 4).

7. Application of radar chart(s) illustrating the factors (criteria) selected for the analysis and levels corresponding to them to all organisations taken into account in the comparison (statistical and/or dynamic) (figures 2-6).
8. Attachment of weights, e.g. on a scale up to 1.00, to each of the factors (criteria) when the analysis refers to the value of organisations from the point of view of various groups of stakeholders (Fig. 10).
9. Application of the mathematical formula for the surface area of an irregular polygon to calculate the value of each of the organisations.
10. Comparison of the value of each organisation depending on the purpose of the research done (measurement of the organisation value (dynamic as well); multi-criteria comparisons of organisations; evaluation of organisations from the point of view of various groups of stakeholders).

As a result of this paper, there will be a measurement and comparison of the value of organisation external environment components, as in the author's opinion, it is possible to apply the presented procedure to strategic management in order to enrich the methods of strategic analysis of the external and internal environments.

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Marzena WÓJCIK-AUGUSTYNIAK, habilitated PhD is the Associate Professor at Siedlce University of Natural Sciences and Humanities, Poland, a Chief Editor of "The Scientific Papers of the Siedlce University of Natural Sciences and Humanities, Series: Administration and Management", the Project Team Leader of the Siedlce University at the Project "Certified Digital Accessibility Training" within ERASMUS+ Programme, Member of the Organizational Committee of the International Conference MANAGEMENT.

Research interests: strategic management, including strategic analysis; higher education institutions, value innovation.

ORCID ID: <https://orcid.org/0000-0001-5096-2863>

Register for an ORCID ID:

<https://orcid.org/register>

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CORPORATE SOCIAL RESPONSIBILITY OF BUSINESS AS A FACTOR OF REGIONAL DEVELOPMENT

Olga Yu. Voronkova ^{1*}, Margarita V. Melnik ², Yulia V. Nikitochkina ³, Nadezhda M. Tchuykova ⁴,
Alla A. Davidyants ⁵, Svetlana V. Titova ⁶

^{1*}Altai State University, Lenin Ave., 61, 656049, Barnaul, Russian Federation

² Financial University under the Government of the Russian Federation, Leningradsky Prospekt, 49, 125993, Moscow, Russian Federation

³ Financial University under the Government of the Russian Federation, Lenin gradsky Prospekt, 49, 125993, Moscow, Russian Federation

⁴Plekhanov Russian University of Economics, Stremyanny lane, 36, 117997, Moscow, Russian Federation

⁵ Sechenov First Moscow State Medical University, 119991, Moscow, Trubetskaya st., 8-2, Russian Federation

⁶ Kazan Innovative University named after V.G. Timiryasov, Moskovskaya st., 42, Kazan, Russian Federation

E-mails: ^{*1}olka2004@yandex.ru (Corresponding author)

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Abstract. The business community plays an essential role in ensuring sustainable regional development. This is due both to the powerful financial potential of business, which is particularly important with limited state budgetary resources, and to the high scientific and technical potential of companies, which is essential for maintaining their international competitiveness. The contribution of business to social development and sustainable regional development will depend, first, on the growth in traditional activities and the creation of new projects, and second, on the modernization of existing industries for reducing the negative impact on the region's environment and population. In recent decades, the concept of social responsibility of business, that is, its responsibility to the population or society has been developed by the most conscious and forward-looking part of the Russian business community, which has initiated impressive voluntary activity in this field. This relates essentially to large private or state-owned businesses. The business community is actively engaged with interested business and social groups, implementing contemporary international standards of socially oriented and environmental management, publishing social reports, including in the field of sustainable regional development.

Keywords: sustainable development; business entities; social responsibility; regional development

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JEL Classifications: Q01, I30, J59

1. Introduction

The development of corporate social responsibility in Russia remains inadequate and noncompliant with international standards and does not actually cover small and medium-sized businesses. The point is that social responsibility, presented to society in an open form, means the activities of enterprises in three "zones" of responsibility and sustainable development: economic (quality and safety of products and services, their physical and price availability), environmental (reduction of harmful emissions and other environmental pressures) and social (development of the in-house teams and external social projects, including charitable ones) (Kuznetsova et al., 2019; Akhmetshin et al., 2018; Frolova et al., 2017). As a rule, Russian small and medium-sized businesses are limited to local charity (Fedulova et al., 2019; Dunets et al., 2019; Ishchenko and Magsumov, 2019), presenting it as the dominant form of their social responsibility.

In Russia, in addition to extremely poor involvement of small and medium-sized businesses in this process, there is no progressive development in this area among large state and partially state-owned enterprises. This is largely due to the lack of transparency in doing business in Russia. Thus, open publication of social and environmental reports or reports on sustainable development under international standards requires additional voluntary disclosure of important data in all areas of business activity. As many studies have shown, the transparency level of Russian state-owned businesses is much lower compared to private businesses, which, of course, cannot be considered normal (Dynkin et al., 2018; Tadeu et al., 2019; Demchenko et al., 2019; Porokhin et al., 2014). In theory, everything should be exactly the opposite: after all, state-owned companies inherently should be more open to society and more socially responsible.

2. Methods

The research is based on the study of corporate social responsibility of the business community as an essential factor in the sustainable regional development, the formation of organizational and economic relations between subjects of sustainable development, in particular, through the mechanism of social partnership. The works of Russian and foreign scientists, scientific reports and recommendations, laws, decrees of the President, orders of the Government of the Russian Federation, regulatory documents of the constituent entities of the Russian Federation, the regulatory framework of foreign countries served as a theoretical basis for the study. The methodological basis was a systematic approach that ensured the complexity, consistency, and focus of the study. The authors applied analytical, abstract-logical, computational-constructive, economic-statistical, monographic and other research methods.

3. Results

For nearly three decades, developed and developing countries have been paying increased attention to corporate social responsibility (Campbell, 2007; Folke, 2006; Moon, 2002; Ermakova et al., 2016; Salamon, 1987; Aktan et al., 2018; Tvaronavičienė, 2018; Moumen et al., 2019; Rezk et al., 2019).

The most notable initiatives in this area have been put forward during this period. Those include the United Nations Environment Program (UNEP) Financial Initiative, which brings together more than 200 leading and largest global banks and investment companies, has been operational for twenty years and aims to ensure their compliance with the principles of socially and environmentally responsible financing and investment. The International Extractive Industries Transparency Initiative, launched in 2002 at the Johannesburg Summit on Sustainable Development, is becoming increasingly important. It aims to ensure the transparency of private and state revenues and payments in the mining sector, combining the largest resource-extracting and processing companies and governments of many

African and Latin American countries, which have recently been joined by Asian states: Azerbaijan, Kazakhstan, and Kyrgyzstan.

The global initiative for reporting on the sustainable development of enterprises of all sizes and types of activity is now fully operational. Today, thousands of leading world companies, including transnational ones, report under the international GRI standard. Those include about 50 Russian companies. Most international initiatives consider the sustainable development of enterprises as a central goal of corporate social responsibility in its three-dimensional dimension: economic, environmental and social. It is proved that steady production growth, inextricably linked to reducing environmental pressures and a corresponding increase in the social security of employed workers and social support for the regional population, is becoming the main ideology of the modern business community. In total, more than 10,000 leading global companies regularly report to the public on corporate social responsibility and sustainable development (Kitzmueller, 2010).

At the same time, the leaders of many large Russian companies are not satisfied with the term "corporate social responsibility". This is not accidental since the term "social" implies the company's responsibility to society as a whole, not limited to its investors, employees and customers, which does not always suit businessmen based on their understanding of the allocation of social responsibility in the broad sense. Enterprises pay taxes, and, accordingly, the state must correctly and efficiently use them for the benefit of society, that is, it is a function of the state, and not of companies as such. At the same time, enterprises do not deny their public responsibility, in particular in the field of production ecology, as well as in understanding their responsibility in the chain of suppliers and consumers of the products and services proposed. Therefore, many companies prefer to use a slightly different formula for its activities in this area, namely the "corporate civil responsibility" (Blagov, 2015; Andreev, 2014; Bobylev et al., 2017; Solodova et al., 2018; Tannady et al., 2019). This term reflects the voluntary nature of the civil behavior of enterprises that are responsible for the processes taking place in their business environment and society as a whole.

Recently, several Russian companies have moved away from the attitude "we produce the product that the consumer needs and pay taxes, this is our responsibility" to open civil responsibility, which is voluntary. There are two main reasons for this. First, the dependence of manufacturing companies on the social conditions of their activities in the regions of their presence is objectively increasing. Second, the reason motivating companies to invest in this "non-productive sphere" is their awareness that consistent systematic implementation of corporate social responsibility allows introducing a non-financial risk management system, which is based on engagement with stakeholders.

These two main directions of change in the field of corporate social responsibility result in the consistent improvement of corporate governance, a significant increase in its level, which positively affects the image, business reputation and, ultimately, capitalization of enterprises. That is, in terms of operation, enterprises incur additional non-productive expenses, but ultimately benefit from an increase in their market value or capitalization. It is worth noticing that the capitalization rate significantly exceeds the growth of corporate social responsibility costs (Shatalova et al., 2015, 2016; Ivanova et al., 2019; Rahman et al., 2017).

It is understood that sustainable development is the main idea of the future in the 21st century. This is reflected in the conceptual documents of the UN, including three most important documents: "The future we want" (2012), which defines the prospects for humanity in the 21st century in the concept of sustainable development, based on "green" economy; "The agenda for sustainable development up to 2030" (2015); Paris Climate Agreement (2015), which sets the priorities for combating the climate threat in the world and in all countries until 2030-2050 (Androniceanu, 2019). These UN documents successfully combine both conceptual priorities and specific objectives of the countries and peoples. These documents contain quantitative indicators and a set of measures that allow governments to plan their actions for the implementation of the decisions taken. As a result of complex work, the UN adopted 17 Goals and 169 tasks for their implementation.

The goals and objectives in the field of sustainable development in its content are complex, global and universally applicable. At the same time, they allow for consideration of differences in national mentality, opportunities and levels of development, as well as imply the respect for the national strategies and priorities. The objectives were drafted in the form of global recommendations, while every government sets its national objectives, guided by global wishes, but considering national circumstances. Every society at the country level decides how to ensure that these global challenges are recognized in the form of recommendations in the national planning processes, measures and strategies.

Thus, the Russian government has limited to the list of 8 objectives, some of which were reformulated given the Russian specifics (Rogach et al., 2018). For example, the second UN Goal "Achieving universal primary education" was replaced by the goal "Ensuring accessibility of education". In the UN goal No. 6, malaria was replaced by tuberculosis, which is a more relevant disease for Russia (see Table 1).

Table 1. Millennium Development Goals (2000-2015) adapted for Russia

No.	Goal definition
1	Poverty reduction and hunger eradication
2	Ensuring the accessibility of education
3	Promoting gender equality and women's empowerment
4	Reducing maternal mortality
5	Reduction of under-five mortality
6	Combating HIV/AIDS, tuberculosis and other diseases
7	Ensuring environmental sustainability
8	Participating in global cooperation that meets Russian national interests

Mankind has made significant progress in implementing the Millennium Development Goals (MDG); progress has been made for all goals and objectives. Thus, material welfare has increased across the globe, the hunger problem has softened. Due to the growth of the national economy and the well-being of its citizens in the early 2000s, Russia has achieved tangible progress in the main development goals – nominal cash incomes per capita for 2000-2015 had increased 13.3 times. During this period, life expectancy had increased by 6 years, including 4.4 years for women and 6.9 years for men. However, the 2014-2016 crisis revealed the instability of the Russian export-raw development model (Prodanova et al., 2019; Zubarevich, 2018; Takhumova et al., 2018; Luzina et al., 2019; Verevkin, 2010).

The country has witnessed intensified problems of human development. There is a vital need for new development paths with the priority given to the sustainability and development of human potential. The scope and ambitions of the new "2030 Agenda" of the global community have grown dramatically: the Sustainable Development Goals (SDG) contain more than doubled as compared to Millennium Development Goals (2000-2015) – it contains nearly 10 times more objectives and 5 times more indicators (Table 2). The time interval remained unchanged – 15 years, which makes it possible to monitor the program results within the political career of the legislatures who adopted the program. Shorter terms would not have given enough time to achieve results and would be too dependent on business and electoral cycles in the world's leading countries. Longer terms would not provide for the necessary concentration of efforts and could lead to the fact that new generations of politicians would set new tasks due to the significantly altered situation in the world.

Table 2. Comparison of the Millennium Development Goals (2000-2015) and the Sustainable Development Goals (2015-2030) (according to the UN)

Indicators	MDG (2000-2015)	SDG (2015-2030)
Goals	8	17
Objectives	18	169
Indicators	48	230

In Russia, it makes sense to adjust the goals of sustainable development at the regulatory and program level. Thus, scientific, methodological, informative and financial support for adapting sustainable development goals is presented in the Federal Law No. 172 "On Strategic Planning in the Russian Federation", which defines criteria for achieving strategic goals and substantiates the priorities of state policy in the field of socio-economic development and national security. Strategic project documents developed within the framework of goals based on the sectoral and territorial principle at the federal level should be supplemented by regional program documents, which will contribute to the implementation of the Spatial Development Strategy of the Russian Federation and the socio-economic development strategy of the regions, provided for by the law "On Strategic Planning in the Russian Federation" (Vinichenko et al., 2016). The study revealed that achieving the country's sustainable development goals might not be feasible without including the business community in the process of social responsibility. The authors believe that the social responsibility of business is a system of ethical standards and values, as well as a consistent set of economic, environmental and social measures implemented by continuous systemic interaction with stakeholders aimed at reducing non-financial risks, permanent improvement of goodwill and business reputation, increasing capitalization and competitiveness of the company, in order to ensure its profitability and sustainable development (Korableva et al., 2018; Plaskova et al., 2019; Da Silva et al., 2019; Sharafutdinov et al., 2019; Mukhtarova et al., 2017).

The sustainable development of the company is a complex matrix process for the business, which covers all areas of its activity and all management functions to reduce risks and losses, as well as to increase its efficiency, environmental friendliness and social responsibility.

The social responsibility of Russian companies is determined by their status and voluntary actions in this direction, which are shown in Figure 1.

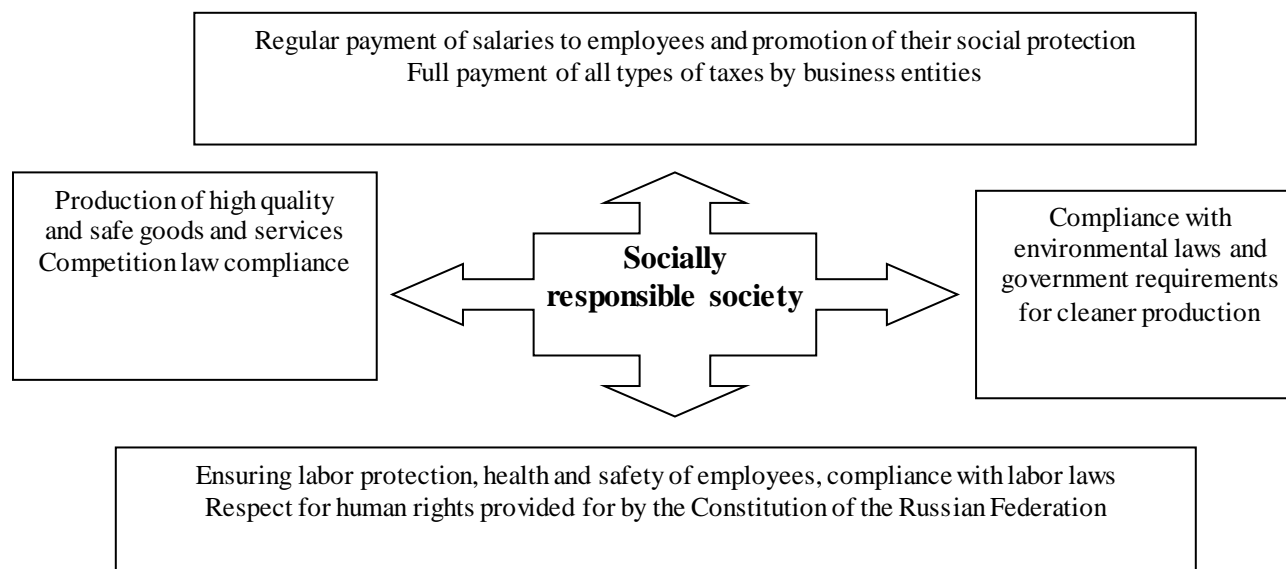


Fig. 1. The minimum set of corporate social responsibility indicators

The authors believe that there is a tendency to shift social partnership towards the local community. This indicates that the interests of business structures are transferred from company employees to the external social environment. It can be concluded that the social interests of Russian businesses have also changed. In most companies, social policy is implemented based on principles approved by the highest executive body, corporate social programs are regular, and the funds for their implementation are included in the total budget. In 2014, the "Alliance Media" Russian business portal conducted an online survey of more than 1,500 entrepreneurs on social responsibility of business structures, which is highly relevant in Russia. The most common answers to the question "What actions do you attribute to the concept of social responsibility of the business community?" were: provision of employee benefits (32%), creation of new jobs (31%), assistance to social facilities (28%) (Pavlov, 2019).

Following society's expectations, socially responsible Russian business can assume additional obligations that are part of a voluntary set of social responsibility indicators that are in the public interests, namely:

- to align the economy and corporate governance with the principles of social responsibility, enshrined in the Code of Corporate Conduct and Social Charter of Russian Business;
- to develop and consistently comply with internal codes or other documents of internal business ethics;
- to constantly develop quality, consumer properties and social significance of products and services;
- to maintain good business practice by establishing secure relationships with suppliers, distributors and customers, giving preference to those companies that meet the requirements of social responsibility;
- to support the development of small and medium-sized businesses, including internal technological chains, as well as to participate in relevant sectoral and intersectoral programs and funds;
- to take technological measures aimed at saving energy, water, and other resources;
- to organize the processing of industrial waste and wastewater treatment, gradually introducing non-waste production technologies;
- to control the emissions of substances that deplete the ozone layer, greenhouse gases, chemicals, and other harmonic emissions into the atmosphere;
- to ensure sustainable land use and support for biodiversity and natural habitats, including recreational areas and reserves;
- to ensure participation of social policy in social investments through internal and external social programs;
- to support personnel development and provide in-house training programs;
- to implement social projects of sponsorship and charitable nature in the territories of the company's presence, maintain their social well-being, safety, and sustainability;
- to participate in sponsorship and charity programs of regional and federal significance aimed at solving acute national problems;
- support social projects in culture, sports and education;
- to participate in public-private partnership projects aimed at solving social and environmental problems;
- to engage in the international charitable and social projects;
- to support public and non-profit organizations of civil society;
- regularly hold dialogues and public hearings with interested parties (stakeholders): shareholders and investors, employees and trade unions, suppliers and consumers, representatives of local, regional and federal state authorities, media, professional associations, public and non-profit organizations, etc. and thereby implement required changes to their activities;
- to increase business openness and transparency through regular social reporting and international reporting on sustainable development, thus improving the quality of production management, social development and non-financial risks.

Additional indicators and measures in the field of business social responsibility are not restricted, being the subject of a voluntary civic initiative in cooperation with the company's stakeholders and society as a whole. Contributing to the effective management of non-financial risks, additional activities allow a company to demonstrate its moral responsibility for the state and development of society. Corporate social responsibility is a means of continuous and consistent increase in the competitiveness of Russian business, stimulating its technological and social innovativeness. In March 2013, the advisory GOST R ISO 26000:2012 "Guidance on social responsibility" came into effect, which is entirely based on ISO 26000:2010 (12, 2013). This standard is the first to define and disclose the concept of social responsibility of any company in accordance with the internationally accepted approaches. The standard provides a platform for integrated management of social responsibility in any company, outlining general principles and parameters of activities aimed at solving specific problems. This allows for developing and implementing a balanced strategy of social responsibility, increasing the effectiveness of interaction both within the company and with external stakeholders, as well as minimizing the risks associated with this interaction, based on internationally recognized approaches. Companies throughout the world and their stakeholders are increasingly aware of the need for socially responsible behavior and its benefits. At the same time, promoting sustainable development is the main goal of social responsibility.

The standard's structure and format conclusively demonstrate that the company's performance in relation to the society, in which it operates, and its environmental impact have become an extremely important part of assessing its overall performance and its ability to continue effective operation. This partly reflects the growing awareness of the need to maintain healthy ecosystems, social equity, and good organizational governance. In the long run, all company's activities depend on the well-being of global ecosystems (Yemelyanov et al., 2018). Companies are increasingly criticized by various stakeholders. The perception and reality of a company's performance in the field of social responsibility can influence, among other things:

- its competitive advantages;
- its reputation;
- its ability to attract and retain workers or members, customers, clients or users;
- maintaining its employees' morale welfare, engagement and productivity
- attitudes of investors, owners, donors, sponsors and the financial community; and its relationship with companies, governments, media, suppliers, peer organizations, customers and the local community.

GOST R ISO 26000: 2012 guides on the principles underlying social responsibility, recognition of social responsibility and stakeholder engagement, major topics and issues related to social responsibility (see table), and ways to integrate socially responsible behavior into the organization. This standard emphasizes the importance of results and improved performance in social responsibility.

All major topics apply to any organization. Each major topic incorporates several problems. Every company must decide which solution is applicable and most significant through independent analysis and dialogue with the interested parties.

All over the world, and Russia is no exception, the problems of non-financial risks play an increasingly strong role. They become increasingly important for investors, along with commercial, industrial and economic ones. Starting from about the mid-1990s, reporting on corporate social responsibility closes this "information gap" for the investor, showing and proving to him that this company pays constant attention to environmental and social aspects in its activities, thereby reducing the risks of social internal and external conflicts, as well as environmental sanctions (Hinzman et al., 2014; Movchan and Yakovleva, 2019; Razumova, 2017; Goryushkina et al., 2019).

Under favorable circumstances, corporate social responsibility in the Russian Federation can become the basic ideology of corporate governance and management, as has already happened in many developed countries. In modern Russia, there is a whole palette of components of corporate social responsibility, and so far, each company provides its definition of this concept through the prism of its strategic objectives and priorities, its corporate culture and the degree of responsibility and obligations it is willing to assume.

Conclusions

Leading Russian socially responsible companies define several interrelated characteristics of their concept of social responsibility:

- Corporate social responsibility is a strategic business approach to managing the company's social, environmental and economic responsibility, which allows it to define and formulate a circle of obligations and areas of responsibility and implement them according to the principle of continuous improvement as part of the overall strategy for sustainable business development;
- Corporate social responsibility is a set of principles of conduct and management adopted by the company voluntarily and having a significant impact on the decision-making process at any level, based on a responsible attitude and incorporation of feedback from the parties that are strategically important for sustainable business development;
- Corporate social responsibility is a management system, which comprises a set of mechanisms and tools that allow managing coordinated and balanced non-financial aspects of the company.

This approach would encourage socially responsible companies to constantly and consistently implement this activity through regular dialogue with society and apply it in strategic planning and company management. Furthermore, it will also be reflected in the resulting system of economic, environmental and social indicators. The focus of this study is that any production and economic decisions are made in view of their social and environmental consequences for the company and society. In that framework, corporate social responsibility turns into a powerful factor in strategic development, strengthening the business reputation and the company's competitiveness.

In the Russian regions, as well as at the municipal level, there is a growing understanding of the need to build relations with business on a permanent and understandable basis. Whereas previously regional and local authorities turned to business mainly to urgently fill in "gaps" in social, environmental and economic infrastructure, today most of the governors, regional legislative assemblies, and city mayors prefer to plan joint medium-term projects and programs in various spheres. This is beneficial to both government and business. Stable partnerships are gradually built up. However, the planning for "sustainable regional development" is still far away. Of the known attempts, it is worth noticing only long-term development programs for the Tomsk Region and the city of Novosibirsk.

Corporate social responsibility is not a goal but a means to meet the urgent needs of people and society. The role of the state here is to "launch" this process in the right direction without overly administering the business by establishing clear requirements and rules, as well as economic and moral incentives, which shall not be changed annually, which too often happens with state regulation of the economy and environmental protection in Russia.

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Olga Yu. VORONKOVA

ORCID ID: <https://orcid.org/0000-0002-3106-4643>

Margarita V. MELNIK

ORCID ID: <https://orcid.org/0000-0002-7428-9535>

Yulia V. NIKITOCHKINA

ORCID ID: <https://orcid.org/0000-0002-2558-4394>

Nadezhda M. TCHUYKOVA

ORCID ID: <https://orcid.org/0000-0001-6570-4787>

Alla A. DAVIDYANTS

ORCID ID: <https://orcid.org/0000-0002-5298-5767>

Svetlana V. TITOVA

ORCID ID: <https://orcid.org/0000-0002-8419-2382>





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MAIN TRENDS OF GOVERNMENT REGULATION OF SECTORAL DIGITALIZATION

Andrei V. Glotko ^{1*}, Aleksandra G. Polyakova ², Mariya Yu. Kuznetsova ³, Kseniya E. Kovalenko ⁴,
Rustem A. Shichiyakh ⁵, Margarita V. Melnik ⁶

^{1*} Gorno-Altai State University, Lenkin Street, 1, Gorno-Altai, 649000, Russian Federation

² Plekhanov Russian University of Economics, Stremyanny lane, 36, 117997, Moscow, Russian Federation

² Industrial University of Tyumen, Volodarskogo Street, 38, 625000, Tyumen, Russian Federation

³ Sechenov First Moscow State Medical University, 119991, Moscow, Trubetskaya Str., 8-2, Russian Federation

⁴ Altai State University, Lenin Ave., 61, 656049, Barnaul, Russian Federation

⁴ Ural State Law University, Russian Federation, 620137, Yekaterinburg, Komsomolskaya St., 21, Russian Federation

⁵ Kuban State Agrarian University named after I.T. Trubilin, 350044, Krasnodar, Kalinina Str. 13, Russian Federation

⁶ Financial University under the Government of the Russian Federation, 125993, Leningradsky Prospekt, 49, Moscow, Russian Federation

E-mails: ^{1*} ganiish_76@mail.ru

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Abstract. This paper examines the principal trends of the government regulation of the milk-producing industry. It focuses on the rationale of those trends for improving the government regulation of dairy industry parameters and the development of effective methods for their implementation in the context of transformation into the digital economy. The study explores theoretical positions, approaches, and principles of the government regulation of digitalization of the dairy industry. It also identifies the essence and forms of this regulation. The researchers developed an economic and mathematical model of the relationship between the dairy industry parameters through a multi-level chain of indirect parameter relationship. The researchers also worked out the methodological foundations for modeling the dairy industry using digital technologies. A reverse forecasting technique was developed to estimate the necessary volume of the government support required to achieve dairy industry target indicators at any level of regulation. The model was tested with various scenarios for forecasting the results of the government regulation of the dairy industry in order to achieve the target criteria.

Keywords: digital economy; government regulation efficiency; digital models; forecasting technique

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1. Introduction

In terms of the gross agricultural output, the Russian Agro-Industrial Complex (AIC), which includes the dairy industry, sufficiently large. As of 2018, the Russian Federation produces about 32 million tons of milk (including

the marketable milk comprising more than 22 million tons) of milk per year, which provides up to 83% of the population's need for milk and dairy products. Despite a rather high level of overall food security achieved in the country - surpassing the targets of the Doctrine of Food Security of the Russian Federation in most positions, the dairy industry turns out to be a bitter exception. According to the Doctrine of Food Security, the country must produce milk (and dairy products equivalent to milk) to a level of at least 90% (Tultabayeva et al., 2017, 2019; Almeida et al., 2019). Taken together, the insufficient government support of livestock industries, as the raw material basis of domestic food production, and the insignificant expansion of the country's export potential result in low levels of both production efficiency and technical equipment in most agricultural enterprises, especially within the dairy industry (Tikhonov et al., 2019).

A low production efficiency of milk and dairy products negatively affects the quality of life of the country's population. In the pre-reform period, the dairy industry in Russia completely met the population's need for milk and dairy products at the level of medical standards. At present, and at the current rate of consumption, the level of self-sufficiency in milk and dairy products of the population of the Russian Federation (RF) is 70%; in the Siberian Federal District (SFD), it is 75%. There is also a decreasing trend of milk and dairy product consumption per capita of about 1% annually (in the Russian Federation from 75% in 2014 to 70%, and in the Siberian Federal District from 79% to 75%).

To eliminate these negative tendencies, urgent measures are needed to strengthen the government support and stimulation of the dairy industry, primarily because of its effective transformation into the digital economy (DE) (Sharafutdinov et al., 2019; Sycheva et al., 2019; Petrenko et al., 2019; El Idrissi et al., 2020). Therefore, the need to develop theoretical principles and practical recommendations for improving the process of the government regulation of the dairy industry in the context of its transformation into the DE determines the relevance of the study.

2. Literature review

An analysis of the scientometric databases of the RSCI and WoS shows that more than 20% of the research on the problems of the agro-industrial complex is related to the dairy industry. This indicates its importance and the rationale of choosing it as a study object. At the same time, there are practically no works devoted to the regulation of the dairy industry in the context of digitalization. Only one publication in the RSCI (Kudryashov, 2019) and one publication in the WoS (Hansen, 2019) consider these particular problems. Since the dairy industry is developing in almost all countries of the world as well as in the regions like the Russian Federation and its territorial entities, the Novosibirsk region, which is in the center of the Siberian District, was chosen as an object of the research. The chosen research topic is characterized by three keywords: the dairy industry, regulation, and digitalization.

Digitalization (digital transformation) is most often understood as a change in the form of doing business in digital reality based on data (Yandex Zen, 2019; Prodani et al., 2019). *"The digital economy is an environment that includes a combination of digital infrastructure and innovative diversification of information and communication technologies for doing business"* (Chernyakov, 2016). Considering the transition of the agro-industrial complex to the DE, the research should rely on the following definition: *"the government regulation in agriculture is the real-time economic impact of authorities using digital support for the production, processing, and the sale of agricultural products, raw materials and food, agricultural infrastructure"* (Chernyakova, 2019). Taking into account the industry specifics of the dairy subcomplex, the following definition can be given: *"Regulation of the dairy industry in the context of digitalization is the real-time economic impact of authorities using digital support for the production of milk, milk processing, and the sale of milk and dairy products, on the infrastructure of the dairy sub-complex."*

Based on various sources of information (Sysuev et al, 2017; Bobkova et al., 2015; Petrik and Oshakbaev, 2015; Pavlyshyn et al., 2019; Rahman, 2017), a system for the development of organizations of the dairy sub-complex of the agro-industrial complex was proposed, which is a closed system consisting of four main elements: causes, goals, functions, and principles of the government regulation of the dairy industry. All of the listed components of the system elements are tentative, not constant, and changing their components requires adjustments of other elements (one or more). Consequently, the system is changing dynamically, and the task of the regulation is to determine the vector of these changes (Hirdinis, 2019; Movchan and Yakovleva, 2019; Ermakova et al., 2016; Dunets et al., 2019; Regaña et al., 2019).

Badalyan M.E. in his study suggests that the system of the government regulation of the dairy industry should be formed in such a way that the regulation should use the paradigm of the “efficient core activity” (Badalyan, 2013) through a clear formulation of the goals of the activities and the choice of more effective means of their implementation. To increase the efficiency of using digital technologies in the dairy industry, it is necessary to 1) introduce innovative technological processes for the production of milk and dairy products and 2) improve the information and technology support for managing these processes (Chernyakov and Chernyakova, 2015).

Agricultural production is developing along the path of automation and computerization (Burda, 2018) including such innovations as electronic herd management systems. Internet of things (IoT) solutions developed in the Russian Federation such as the Rightech IoT Cloud and the kSense IoT platforms can provide for, among other things, livestock management. Thanks to these platforms, farmers can track livestock location, monitor pregnant and sick animals, determine rational milking times, etc. There is a continual improvement of this new technology, and farmers show a great interest in obtaining it; however, only 3-5% of the country’s dairy farms have introduced comprehensive automation of herd management (Surovtsev and Nikulina, 2019).

Integrating DE technologies into the dairy industry can reduce the costs by at least 23% (Livestock industry ..., 2019). According to the experts of the PwC group (PwC is the largest audit network), the major challenges for Russian farmers include the growth of domestic and foreign demand for agricultural products as well as the need to increase labor productivity and competitiveness. These challenges will inevitably be a driving force for the technological development of the dairy industry. On November 27, 2018 at the Fifth International Agro-Industrial Dairy Forum, a session was held on the “Digital Agenda of the Dairy Industry” (Ministry of Agriculture of the Russian Federation, 2018). It was attended by Irina Ganieva, who is the Director of the Department of Digital Development and Management of State Information Resources of the Agro-Industrial Complex of the Ministry of Agriculture of Russia. Ganieva introduced the departmental project “Digital Agriculture” (Departmental Project “Digital Agriculture,” 2019). Its goal is to provide a technological breakthrough in the agricultural sector through the introduction of digital technologies in agriculture. It is assumed that this change will have doubled the labor productivity in agricultural enterprises by 2021.

One of the stages of the project implementation will be the creation of the Intellectual system of government support measures (Korableva et al., 2018). Integration with the databases of the Russian Meteorological Service and the Ministry of Emergencies will allow for the adjustment of subsidies for the introduction of emergencies in the regions. It is planned that by 2021, 100% of contracts with recipients of the government support will have been made in the electronic form. By the same time, all agricultural products for export will have been accompanied by a paperless system “from field to port.”

According to the research from the Ministry of Agriculture of the Russian Federation, the introduction of digital economy technologies provides positive economic effects and can reduce the costs by at least 23% as well as increase agricultural production by 361.4 billion rubles when an integrated approach is followed (Kokova, 2019).

3. Theoretical background

The Strategy for Spatial Development of the Russian Federation identifies the most important and promising areas of effective economic specialization of the Novosibirsk region directly related to the dairy industry for the period up to 2025:

1. Crop production and livestock, provision of appropriate services in these areas,
2. Food production,
3. Beverage production.

The Novosibirsk region shows stable positive dynamics in increasing the production of milk and dairy products per capita, which allowed it to rise in the all-Russian ranking of regions in terms of production from the 14th place in 2014 to the 11th place in 2018 and in terms of consumption from the 11th place in 2014 to the 4th place in 2018. The region's share of total Russian milk production also increased significantly from 2014 to 2018 by 0.2% including the market share by 0.3% and reached 2.3 % and 2.7% respectively. The success of the Novosibirsk region in developing the dairy industry and providing the population with these products is fully correlated with the regulatory impacts of the government support for this industry in the region. The comparison of the data for 2014-2017 does not show a close linear relationship (the correlation coefficient of 0.58) between the volume of government support funds for the dairy industry and the volume of milk produced in the Novosibirsk region, which indicates the complexity of the regulatory impact on the main industry indicator. This necessitates a thorough study of the nature of such an impact in order to find an opportunity to manage it (Yemelyanov et al., 2018).

An assessment of the effect of digital technologies on the parameters of the dairy industry revealed a correlation close to linear between the number of microchipped cattle and daily milk production per cow and gross milk production. The effect of the number of chipped cows (X) on the productivity (Y) is approximated by the following expression:

$$Y = 0,0072 * X + 13,164$$

The use of digital technologies in dairy cattle breeding ensures the increase in labor costs for obtaining a centner of milk up to one person-hour and increase in profitability up to 40% (Gritsenko et al, 2019). In order to provide the population of the Novosibirsk region with high-quality products, the following tasks are set for agricultural producers of the Novosibirsk region:

1. Enhance productivity of dairy cattle through the use of digital technologies, attracting the best global genetics and significantly increasing output.
2. Create a competitive breeding base, increasing not only the number of breeding animals (up to 25% of the specific gravity), but also the milk quality (milk production up to 9600 kg in breeding organizations).
3. In the framework of the federal project "Export of Agricultural Products," ensure that milk production in farms of all categories will have reached the amount of 733 thousand tons by 2024.

Achieving the tasks at hand is impossible without the effective transformation of the dairy industry into the DE. To implement the transformation process, it is necessary to develop effective models, mechanisms, and technologies to predict the necessary events to fulfill these tasks. Using the synergistic effect means to hypothesize the existence of a multilevel model of a stepwise interaction of the relationship between the regulatory effect and the parameters of the dairy industry that do not have a direct functional relationship with it. These parameters have a closer relationship not with the regulator, but with the intermediate indicators, and are dependent on it indirectly. The novelty of the hypothesis is that the correlation coefficient between the regulator and indirect indicators may be close to zero, but the results will show a high degree of accuracy in their calculation.

The implementation procedure (algorithm) of the proposed hypothesis in the form of a multi-level model of a stepwise interaction is shown in Figure 1.

1. The “Initial data” block (Fig. 1) contains the information on the number of the parameters under study (K), time periods analysis (P), and the matrix X (K, P) of the values of each parameter in time intervals. In the “Regulator selection” block, a parameter (one or several) is assigned, the influence of which on other indicators is to be analyzed.
2. After the initial data input, a correlation analysis of the matrix X (K, P) is performed. The values of the correlation coefficients of the regulator are removed from the correlation matrix and ranked relative to other indicators in descending order.
3. Then the model level is calculated. By default, in the initial state, the level is equal to zero. As a result, we obtain: $U = 0 + 1 = 1$ for the first level of (direct) influence, $U = 1 + 1 = 2$ for the second level of (indirect) influence, etc.
4. Then, a cycle is started to select indicators that are significant for a given level. The indicators are excluded from the matrix of values, and the regression coefficients are determined for their dependence on the regulator (direct, indirect first level, etc.). The cycle is repeated until an indicator appears, for which the criterion of restriction is less than the specified one.
5. In the case of $R < 0.5$, the number of untested parameters is analyzed. If $K > 0$, then the indirect regulator of the U-level is selected according to the criterion of the highest correlation coefficient from the significant indicators of the level $R \Rightarrow \max$. The algorithm proceeds to the analysis of the next level of the model and the process is repeated from stage 3.
6. In the reverse situation ($K = 0$), the mechanism completes its work, and the result in the form of mathematical dependencies can be used for further analysis, modeling, and forecasting.
7. The proposed approach does not deny fundamental laws, theories, hypotheses, or mechanisms, but organically uses and improves them, which makes it possible to use the developed mechanisms as universal in the study of the parameters of the dairy industry, for example, in combination with the simulation mod

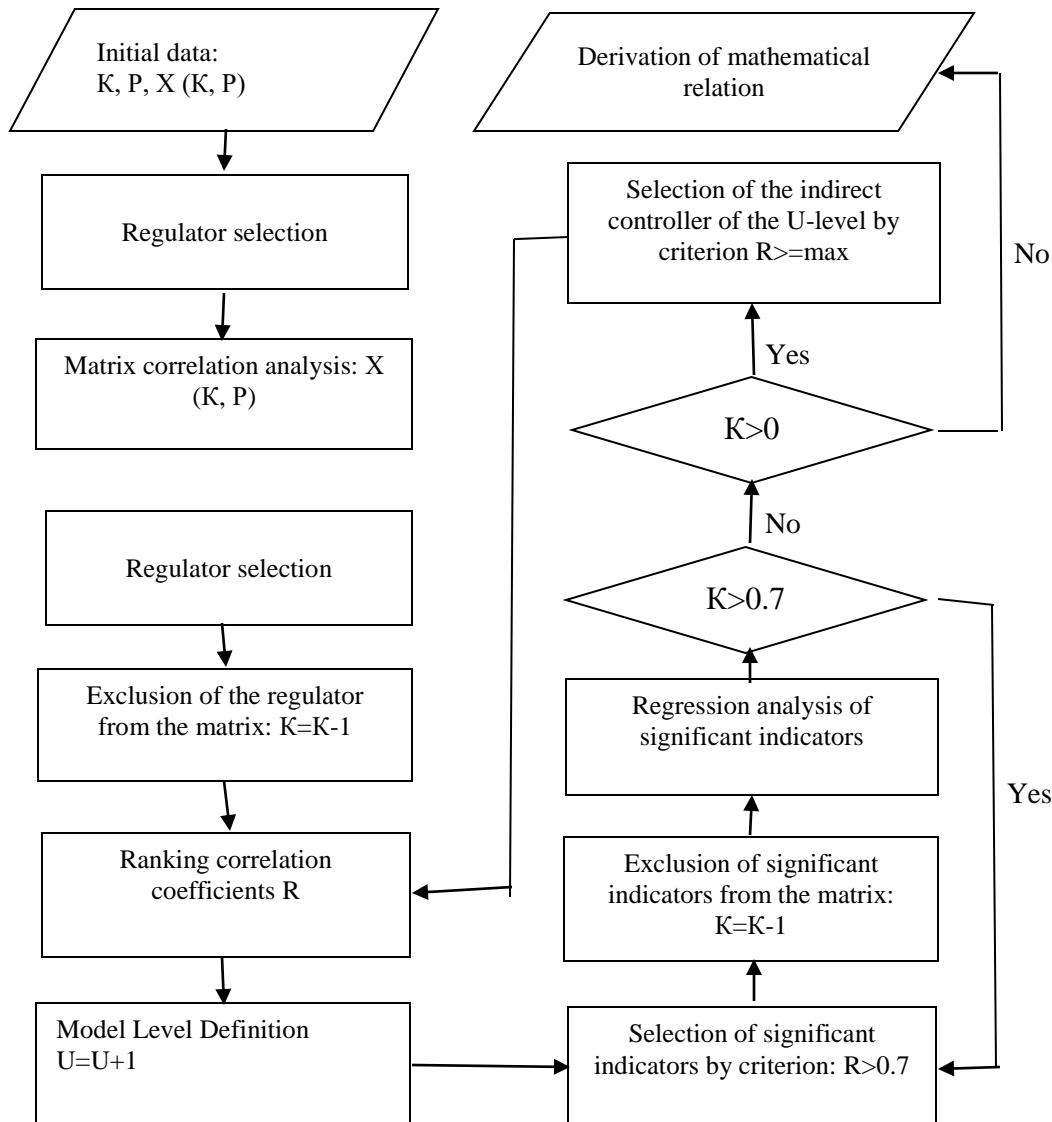


Figure 1. Algorithm for modeling the relationship of parameters for government regulation of the dairy industry

Source: Glotko et al, 2019

4. Data analysis

The algorithm based on the formulas in the form of the mathematical support of a digital model is substantiated. It is proposed to use the regulatory instrument in the form of the government support as the source data in the proposed algorithm, the management of which makes it possible to achieve necessary indicators of the dairy industry. It is also proposed to use the volume of government support funds for the dairy industry as a regulatory impact.

After checking the correctness of the initial data input, the Information and Communication Technologies conduct an analysis and calculation of indicators of the direct influence of the first level. Having calculated the specific parameters and inserting them into the database, the algorithm proceeds to the next step.

The next step is the calculation of indicators of the indirect influence of the second level, based on the results of the calculation of the most significant parameters of the direct influence of the first level. At this step, the indicators that become the source data for the third calculation step are calculated. At the third step, using the most significant parameters of the second step, the final indicators are determined. At the final step, the calculation results are included in a database and can be transferred to the relevant ICT users in an electronic or paper form.

An action plan was developed in accordance with the proposed hypothesis, which ensured using the digital data taken from the open sources to develop digital models of the dairy industry in the Novosibirsk region. The study of the three-level model algorithm was carried out on the basis of the actual data of the Novosibirsk region during 2014-2018.

As a result of the prior study, a three-level model of the influence of the controlling parameter of the government regulation (the amount of government support funds for the dairy industry) on the quantitative and qualitative indicators of the Novosibirsk region industry was proposed.

The first level (direct impact) includes two indicators: the number of cows at the end of the year in agricultural enterprises (AE) and peasant farms (PF) and milk production of breeding cows. This indicates that the regulator stimulates not only a quantitative increase in the herd from the emphasis on breeding cows, but also on a qualitative increase in its milk productivity.

The second level (indirect influence) includes eight indicators: milk production on the farms of all categories including marketable milk, the share of pedigree cows in collective farms, peasant farms, and private farms including dairy and mixed production directions, milk productivity of cows in the farms of all categories including agricultural enterprises and peasant farms, the production of milk and dairy products per capita, for which the regulator does not have a direct strong impact, but they are strongly influenced by the indicators of the first level and, most of all, by the number of cows at the end of the year in the agricultural enterprises and farms.

The third level (secondary indirect influence) includes four indicators that are almost independent of the regulator (the correlation coefficient varies from -0.33 to 0.26) and of the indicators of the first level (the correlation coefficient varies from -0.71 to 0.26), and these third-level indicators have multidirectional vector manifestations. They have a strong interdependence with only some indicators of the second level. In particular, the consumption of milk and dairy products per capita and the milk productivity of cows in private households are most dependent on the production of milk and dairy products per capita (the correlation coefficient makes up more than 0.55), whereas the indicator of milk processing and dairy production in terms of milk is significantly determined by the production of marketable milk (the correlation coefficient makes up -0.81), but it has a paradoxical opposite tendency - with an increase in milk production, its processing in the Novosibirsk region decreases.

Due to the reduction in prices associated with its large production in the region, milk is exported to the neighboring regions: the Altai Territory and Omsk region, which have efficient milk processing enterprises. An unexpected outcome was obtained as a result of the analysis of the number of cows on the farms of all categories at the end of the year. Its strong relationship was recorded exclusively with the parameters of milk processing and milk production in terms of milk (the correlation coefficient of 0.74).

The final results of the multilevel correlation and regression analyses are shown in Table 1. It shows that the error of the obtained mathematical equations does not exceed 9%, which indicates the possibility of using the proposed mathematical tools as a mechanism for predicting the effects of the government regulation on the main indicators of the dairy industry of the Novosibirsk region.

The validity check of the digital model in comparison with the actual data for the previous five years shows that with the smallest relative deviation (less than 2%) the last indicator **X3** in the algorithm (the number of cows on the farms of all categories at the end of the year) is calculated, and with the largest (slightly more than 20%) - **X6** (the share of breeding cows of the dairy and mixed directions of productivity).

Table 1. Interdependence between the volume of government support funds for the dairy industry of the Novosibirsk region and its main indicators

Designation	Digital model	Correlation coefficient	Error, %
Level 1	Direct influence		
X4	$X4 = 0,009878 * X15 + 134,186$	0,87	Less than 2,5%
X11	$X11 = 1,388184 * X15 + 7187,9351$	0,73	Less than 8,3%
Level 2	Indirect influence		
X1	$X1 = 6,634324 * X4 - 255,723$	0,88	Less than 3,2%
X2	$X2 = 10,37241 * X4 - 949,852$	0,82	Less than 8,2%
X5	$X5 = 0,467732 * X4 - 51,2205$	0,89	Less than 8,8%
X6	$X6 = 0,492792 * X4 - 56,2171$	0,89	Less than 1,7%
X7	$X7 = 58,20987 * X4 - 4410,82$	0,90	Less than 4,6%
X8	$X8 = 76,64832 * X4 - 6569,93$	0,89	Less than 5,7%
X9	$X9 = 49,55294 * X4 - 4141,81$	0,90	Less than 5,2%
X12	$X12 = 1,64969 * X4 - 42,404$	0,81	Less than 7,5%
Level 3	Secondary indirect influence		
X10	$X10 = 5,891 * X12 + 1738,445$	0,69	Less than 2,4%
X13	$X13 = 0,5063 * X12 + 186,7629$	0,55	Less than 4,2%
X14	$X14 = -164,429 * X2 + 251345,285$	-0,81	Less than 7%
X3	$X3 = 0,00017 * X14 + 162,947927$	0,74	Less than 1,2%

Source: own research

Legend:

X1 - Milk production on farms of all categories, thousand tons

X2 - Production of commercial milk, thousand tons

X3 - The number of cows on farms of all categories at the end of the year, thousand heads

X4 - Cows at year-end in AO, peasant farms, PSP, thousand heads

X5 - The proportion of breeding cows in AO, peasant farms, PSP, %

X6 - The share of breeding cows of dairy and mixed directions of productivity, %

X7 - Dairy productivity of cows in farms of all categories, kg / year

X8 - Dairy productivity of cows in agricultural organizations (AO), kg / year

X9 - Dairy productivity of cows in peasant farms (peasant farms), kg / year

X10 - Milk productivity of cows in personal subsidiary plots (PSP), kg / year

X11 - Milk productivity of breeding cows, kg / year

X12 - Production of milk and dairy products per capita, kg / year

X13 - Consumption of milk and dairy products per capita, kg / year

X14 - Milk processing and production of dairy products in terms of milk, tons

X15 - The volume of state support funds for the dairy industry, million rubles

5. Results

The mathematical model developed on the basis of the synergistic approach was the basis for the formation of tools for direct and reverse forecasting of milk production and performance indicators of the dairy industry in the region. The direct forecast of indicators of the dairy industry in the region, in contrast to the existing tools, is based on the use of not only a time factor, but also on the amount of government support funds. It provides an opportunity to predict the performance of the dairy industry depending on the amount of the government support. The reverse forecast solves the problem of determining the necessary amount of the government support to achieve the target indicators of the dairy industry at any level of regulation. The application of the proposed tools enables regional authorities to form intersectoral relations in the dairy industry. The effective formation of intersectoral mutual relations becomes possible thanks to the technical equipment and software of the processes of the government regulation of digitalization in the dairy industry.

The forecasting results for 2019 show that a decrease in the government support could lead to a degradation of the dairy industry in the Novosibirsk region. Keeping financing at the same level can only slow down its decline. This indicates an acute current underfunding of the dairy industry by state authorities. The situation may change for the better with an increase in government support funds by at least twice compared to the ongoing funding.

To achieve the recommended rational consumption rate (of milk and dairy products in total equivalent to milk) 325 kg / year / person, the government support funds in the amount of 5,773 million rubles will be required. As a result, this will lead to an increase in the annual production of milk and dairy products per capita up to 273 kg / person and an increase in the heads of cows by 46 thousand at the end of the year in agricultural enterprises, peasant farms, and private farms. It is unlikely to achieve such a result in one year, so the calculated amount of funds will have to be distributed over several years.

With the optimistic development of the scenario, it will be possible to achieve the recommended rational consumption rate (of milk and dairy products in total equivalent to milk) in the Novosibirsk region not earlier than in four years, but with the expected - in 8 years. However, the estimated time frame will vary depending on the actual amount of government support funds allocated. The mathematical model enables to make appropriate adjustments depending on the regulatory influences. If we exclude from the calculations the factor of regulatory influence depending on the amount of the government support and leave only the time factor, then it will be possible to achieve the recommended rational consumption rate (of milk and dairy products in total equivalent to milk) in the Novosibirsk region not earlier than in 30 years (a pessimistic option).

Providing the population with dairy products in accordance with medical consumption standards in the region implies an increase in the effective growth of all parameters of the dairy industry, which can be achieved only with the use of digital technologies, which make it possible to predict the steps of an effective regulatory impact depending on the amount of government support funds. Without the government support and determining its adequate amount, the development of the dairy industry is unlikely.

6. Discussion

Based on various sources of information, the researchers suggest using a system for the development of organizations in the dairy industry of the agro-industrial complex, which represents a closed system consisting of four main elements: causes, goals, functions, and principles of the government regulation of the dairy industry (Frolova et al., 2019; Trofimova et al., 2019). The essential structure of the functioning system is a chain, the first link of which is the sphere of agriculture, the second one is industry, and the final one is services (Safiullin and Akhmetshin, 2019; Murtazina et al., 2018; Plotnikov et al., 2018). It is proposed to consider the essential model of

the digitalization system of the government regulation of the dairy industry as a closed system consisting of three elements: government regulation, digitalization, and parameters of the industry itself.

Perhaps, in the process of shaping the system of the government regulation of the dairy industry, it will be necessary to abandon some of the advanced principles or supplement them with others (Ermekbaeva et al., 2018). However, the proposed principles, which are interdependent and implemented in real life, can become a guarantee of effective management of the dairy industry using the potential of the DE and considering possible risks.

The studies of various Russian and foreign researchers show that the theoretical prerequisites for regulating the dairy industry are based on the empirical data (Fadiawati et al., 2019; Suryono et al., 2019; Suieubayeva and Utegenova, 2020; Shebashev et al., 2019). Regulation should be aimed at increasing not only quantitative indicators, but also qualitative ones; therefore, it requires the coverage of the greatest possible number of parameters. Mathematical models of influence of regulatory parameters on the performance of the dairy industry in domestic and foreign sources are not found. In addition, a study of the influence of risks associated with the transformation of the dairy industry to the DE is not found in the analyzed information sources.

The imbalance between the agricultural and service sectors of the dairy industry is the main reason for the continuing decline in livestock and the level of consumption of milk and dairy products per capita. To solve these problems of the dairy industry, digitalization of the government regulation of pricing and product promotion processes from a producer to an end consumer, bypassing intermediaries, is necessary (Prokhorova et al., 2016). Therefore, at the present time, the further development of the dairy industry will be impossible without accelerating the development and effective use of digital technologies (Smolnikova et al., 2019; Luzina et al., 2019; Ziyadin et al., 2019; Goryushkina et al., 2019; Cech et al., 2018; Tadeu et al., 2019).

The analysis of digital technologies along with cognitive technologies made it possible to identify and classify the main risks arising from the transformation of the dairy industry into the DE. During the analysis, a hypothesis was formulated about the possibility of regulating the industry using the DE risk management mechanism.

In general, it should be noted that the digitalization of the dairy sector of the agro-industrial complex is an inevitable necessity for the effective functioning of this economic sector; and for its productive implementation a government policy is needed directed at using the organizational advantages of Russian agriculture. To solve this problem, it is necessary to analyze the existing trends in the government regulation of the digitalization of the dairy industry for making managerial decisions.

Conclusion

1. An analysis of the dynamics of changes in the number of cows over a 5-year period of time in the Novosibirsk region shows an annual wave-like fluctuation in their numbers with a decrease over the analyzed period within 1%. The main reason of this negative tendency is the presence of intermediaries that create an imbalance between the agricultural and service sectors of the dairy industry. There is also an imbalance between the production and consumption of milk and dairy products per capita. The domestic production in 2014 satisfied only 65%, and in 2018 it satisfied 70% of consumption. Despite the positive tendency to increase this ratio, its level is insufficient for the potential of the dairy industry of the Novosibirsk region. Solving the challenges of eliminating the existing imbalances is impossible without the effective transformation of the dairy industry to the DE. To implement the transformation process, it is necessary to assess the state of digitalization in the region.
2. The foundations for digitalization in the Novosibirsk region including the dairy industry constitute the following: an information and communication data transmission network with a length of more than 7 thousand km, the main and backup data centers, the state information systems including “GIS of the Novosibirsk region,”

“Government Support of AIC of the Novosibirsk region”, “Systems 112,” and others. An analysis of responsiveness of the of the milk-producing organizations in the Novosibirsk region to digitalization shows that less than 1% of them have a high degree of responsiveness, 5–10% have an average degree of responsiveness, 70–80% can adapt to digitalization, and 15–20% are not able to make necessary adaptations on their own. Consequently, most organizations will require a support in the form of various forms of regulation. An analysis of organizations with a high degree of responsiveness to digitalization reveals the possibility of such a transformation process, the effectiveness of which must be analyzed and evaluated.

3. The assessment of the effect of digital technologies on the parameters of the dairy industry reveals a correlation close to linear between the microchipped livestock of cattle and daily milk production per cow and gross milk production. A technological breakthrough in the agricultural sector due to the introduction of digital technologies in agriculture will make it possible to increase labor productivity in agricultural enterprises by 2 times by 2021. To achieve this goal, it is necessary to develop theoretically substantiated new approaches to the development and practical testing of digital technologies that can solve the tasks.

4. One of the high-priority tasks is the need to develop a non-standard approach to the theoretical foundations of regulating the dairy industry and recommendations for its practical application. The research was based on the methodology of a systemic, integrated, and territorial approaches using the methods of economic interpretation of the results, functional, and comparative analyses. The study is novel in the theoretical justification of a multi-level model of the relationship between the parameters of the dairy industry using the foundations of the synergistic approach. The unusual use of the synergistic effect lies in the hypothesis that there is a relationship between the regulatory impact and the parameters of the dairy industry on the existing functional relationships with it through a multi-level chain of indirect parameter relationships. These parameters have a closer relationship not with the regulator, but with intermediate indicators, and are dependent on it indirectly. The ingenuity of the hypothesis lies in the fact that the correlation coefficient between the regulator and the indirect indicators may be close to zero, but the results obtained will show a high degree of accuracy in their calculation. The proposed approach does not cancel the fundamental mechanisms, laws, theories, and hypotheses developed in the framework of the traditional economy but it organically uses and improves them, which makes it possible to use these approaches as universal in the study of the parameters of the dairy industry, for example, in combination with the simulation modeling.

5. Based on the proposed hypothesis, the developed mathematical model made it possible to use the actual data taken from the open sources and to develop an estimation technique of the effectiveness of indicators of the dairy industry in the Novosibirsk region. The algorithm based on formulas in the form of mathematical support for a digital model obtained by the method of the synergetic approach is rationalized. Moreover, the maximum error does not exceed 10%. Based on the results of developing the digital model and testing its ICT, it can be concluded that it can be used in predicting the development of the dairy industry of the Novosibirsk region depending on the regulatory impact in the form of the invested amount of the government support funds.

6. The study proposes the method for predicting the parameters of the dairy industry which enables to calculate the parameters of the dairy industry depending on the amount of government support funds. This makes it possible to use regulatory influences to control the development of the dairy industry in the regions. A direct forecast of indicators of the dairy industry in the region is developed. Unlike the existing tools, the forecast is based on the use of not only a time factor but also on the amount of government support funds in three scenarios of the industry development: pessimistic, expected, and optimistic. The study developed a reverse forecast for the necessary volumes of government support to achieve the target indicators of the dairy industry at any level of regulation.

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Andrei GLOTKO, Gorno-Altai State University, Gorno-Altai, Russian Federation. Doctor of Economics, Associate Professor. Research interest: Economy of agriculture.

ORCID ID: <http://orcid.org/0000-0002-0160-6392>

Aleksandra POLYAKOVA, Doctor of Economic Sciences, Professor of Economics, PhD (econ.), holds a chair in Economics and Production Setup at Industrial University of Tyumen and leads research Plekhanov Russian University of Economics. She has experience and expertise in data-driven analytical systems design, investment appraisal and deployment, regional development and strategic management. Prof. Polyakova has a significant back-track in advisory services for the federal and regional authorities on the matters of economic policy improvement and public administration. Research interests: regional studies, innovations deployment, investment appraisal, Big Data analysis and systems design.

ORCID ID: <http://orcid.org/0000-0002-3674-4111>

Mariya KUZNETSOVA, Senior Lecturer, Professor 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 management, corporate reporting. Research interests: management in dentistry, internal control systems, introduction of digital technologies.

ORCID ID: <http://orcid.org/0000-0002-5488-8979>

Kseniya KOVALENKO, Ph.D in Law, associate professor of labor, environmental law and civil process Department of Law institute, Altai State University.

Expert in the theory of state and law, legal regulation of entrepreneurship, problems of administrative offenses.

Research interests: jurisprudence, digitalization of business processes, big data analysis.

ORCID ID: <http://orcid.org/0000-0001-6017-8933>

Rustem 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>

Margarita MELNIK PhD in Economics, professor of accounting, analysis and audit Department, Financial University under the Government of the Russian Federation. Expert in the theory and methodology of economic analysis, control and audit. Research interests: state management system, audit development concept, innovation management

ORCID ID: <http://orcid.org/0000-0002-7428-9535>

Register for an ORCID ID:

<https://orcid.org/register>

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CRYPTO ASSET ASSESSMENT MODELS IN FINANCIAL REPORTING CONTENT TYPOLOGIES

Tatiana Morozova ¹, Ravil Akhmadeev ^{*2}, Liubov Lehoux ³, Alexei Yumashev ⁴,
Galina Meshkova ⁵, Marina Lukiyanova ⁶

^{1,2} Plekhanov Russian University of Economics (PRUE), Stremyanny Lane 36, 117997, Moscow, Russian Federation

³ CPA, MIATI GL and VAT Accountant RLG Europe B.V. (Swiss Branch), Rue Andre-De-Garrini 4, 1217, Meyrin, Switzerland

⁴ Sechenov First Moscow State Medical University, Trubetskaya st., 8-2, 119991, Moscow, Russian Federation

⁵ Bauman Moscow State Technical University, 2nd Baumanskaya street, 5, p. 1, 105005, Moscow, Russian Federation

⁶ Financial University under the Government of the Russian Federation, Leningradsky Avenue, 49, 125993, Moscow, Russian Federation

E-mails: ^{2*} ahm_rav@mail.ru (Corresponding author)

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Abstract. Given the pace of development of the digital economy, companies' operations with crypto assets are an objective inevitability for most states. At the same time, national jurisdictions no longer have the opportunity to ignore the fact of business working with crypto assets. Meanwhile, without consensus in the consistent resolution of financial, tax, and other cross-country relations, operations with crypto assets can belong to the underground economy sphere to a large extent. In this regard, the issues of regulating macroeconomic factors when reflecting crypto assets in the structure of the current classification, the procedure for their fair valuation, taking into account the formation of classification and content construction in the financial statements of companies, are relevant. Another aspect is to conduct comprehensive analysis in order to consider scientific and practical approaches to the procedure of classification and evaluation of cryptographic assets in scientific research, professional judgments of major audit international organizations. In this regard, the study focuses on a practical analysis of the current accounting policies of companies operating with crypto assets, taking into account the position of the International Financial Reporting Interpretations Committee (IFRIC). Based on the results of the conducted research, the existing models of classification and evaluation of crypto assets are assessed, and the most problematic practical aspects of their application are highlighted. This made it possible to propose promising models for managing the value of crypto assets, containing the existing practices currently used by companies and their possible directions. It was concluded that the most promising way out of the conflict of interests of business and the current rules of International Financial Reporting Standards (IFRS) is to refine the existing standards, introduce rules of classification and evaluation of crypto assets. The authors also do not exclude that the best solution is to develop a new IFRS standard for the accounting of crypto assets.

Keywords: crypto assets; IFRS; bitcoin; valuation models; economics; recognition and measurement; intangible assets; inventory; cash and cash equivalents; financial instruments

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JEL Classifications: E42, E52, G38

1. Introduction

International Financial Reporting Standards (hereinafter referred to as IFRS) are a universal system of communication between the reporting company and its users. The international standards must not be national accounting standards and are not specific to certain jurisdictions. In turn, national accounting standards take into account the specifics of a country's economy, and to a greater extent, the interests of regulatory authorities and regulators. As a result, such an approach may significantly distort the economic meaning of the items recognized in financial statements (Bhatia, 2016; Hilkevics, Semakina, 2019).

Unlike national accounting standards, IFRS were initially focused on providing reliable financial information that can be useful to external users, particularly investors and creditors, in making economic decisions about making investments (Jewitt, 2017; Turishcheva, 2019). At the same time, IFRS may apply to enterprises in a global agglomeration voluntarily, unless the legislation of the jurisdiction provides otherwise. It should be noted that the practice of applying IFRS contains transactions specific to a particular industry. The International Financial Reporting Interpretations Committee (IFRIC) clarifies practical solutions for reporting specific transactions when a specific standard or standards do not provide a definitive solution (Lyapina, 2016). In particular, IFRIC 6 "Liabilities Arising from Participating in a Specific Market – Waste Electrical and Electronic Equipment", IFRIC 1 "Changes in Existing Decommissioning, Restoration and Similar Obligations" and others. The fact that the events described in the IFRIC took place in the practical activities of companies long before the explanations appeared is essential for conducting scientific and practical research (Giungato, 2017). The practice of companies in recognizing and evaluating such transactions was taken into account in developing the clarification statement (Cohney, 2019). It was the practical experience, interpretation of information by business that formed the basis of IFRIC clarifications. Besides, practical experience in interpreting information by business serves as a basis for the legal status of crypto assets, both in terms of the economies of the world countries and in a global approach that affects the restrictions in the circulation of individual states (Petrov, 2019).

However, there is no consensus among professional communities and specialists in operations with crypto assets on the classification and evaluation of such objects. Therefore, it is relevant to summarize the practical and scientific experience in the classification and evaluation of crypto assets. Based on this, the purpose of the study is to analyze approaches to the classification and evaluation of crypto assets in scientific papers, professional judgments of the largest auditing organizations, accounting policies of companies, and develop a model for managing the value of crypto assets from best practices.

2. Literature review

Crypto assets, as a modern economic phenomenon, over the past few years, have become an integral part of the business for global companies. Companies that need to develop accounting policies for disclosing information and presenting indicators in financial statements, as well as companies that do not exclude the possibility of conducting operations with crypto assets, are interested in practical comments and scientific developments in this area (Adhami, 2018). In particular, the research at the Cambridge Center for Alternative Finance (University of Cambridge, Judge Business School) expressed its gratitude to 89 cryptographic companies for their participation in this research. Moreover, according to Szetela (2016), the potential number of companies, which may be interested in practical and scientific research on operations with crypto assets, is limited to the current number of companies in all fields of activity.

In a scientific study by Hileman and Rauchs (2017), it is noted that as a result of the study, over 300 scientific papers on various aspects of the turnover of cryptographic assets have been published over the past few years. Traditionally, most researchers note the starting point of the discussion regarding the formation of the cryptographic network software, the phenomenon of crypto assets, in particular, Bitcoin, and the subsequent challenges for business, the economy, as individual countries, and cross-country economic relations (Goudos,

2017). In this regard, the starting point is a study by a group of authors published under the pseudonym Satoshi Nakamoto in 2008 (Nakamoto, 2008), where the main idea of creating Bitcoin, as well as the purpose of scientific research, is to describe a new way of irreversible transaction between buyer and seller without intermediaries. Most of the authors' works are devoted to the research of the mathematical model of the network, principles of its work, and functioning of the blockchain elements (Firdaus, 2019). Such studies are beyond the scope of this study, but there is a general understanding of critical mining opportunities (Brummer, 2019) (for example, for Bitcoin, it is 21 million units with a 2140 production deadline (Dorofeyev, 2018), which may be used in professional judgment to assess risks in the financial statements of companies.

3. Theoretical background

Since IFRS are not national accounting standards but are designed to be used by companies regardless of their jurisdiction, international and multinational businesses need to develop clear approaches to the recognition, classification, and valuation of crypto assets (Movchan and Yakovleva, 2019). Such approaches must take into account the conceptual framework for the preparation of IFRS reports, the requirements of specific IFRS standards and the established practice of reflecting crypto assets by companies presenting IFRS reports to a wide range of users (Chernysheva, 2019; Amirova et al., 2018; Klunk et al., 2019; Sokolov et al., 2019; Rahman, 2017; Swarts, 2020).

Since the basic research on this issue is global and comprehensive, the task of this study is not to repeat theoretical aspects but to generalize approaches and define controversial positions. Arguments for and against recognition of crypto assets should be taken into account (Bonneau, 2015; Shatalova et al., 2016). However, in the authors' opinion, specific material facts should not be ignored. In particular, such circumstances may indicate a risk group for the presentation of inaccurate information to users of financial statements and problematic aspects of the classification and evaluation of crypto assets (Urquhart, 2019).

Since the object of the study is the approaches to the classification and evaluation of crypto assets, it is essential to look at basic concepts. In particular, PWC has defined crypto assets as "forms of exchange that are performed not physically, but only in a digital form. They are not tied to any real currency and are not secured by any government, central bank, legal person, or underlying asset or commodity. At the same time, they can be quoted on the exchange against other currencies. The most famous example of cryptological currency is Bitcoin". At the same time, the IFRIC provides the following recommendations for specific types of objects, namely:

"a. a digital or virtual currency recorded on a distributed ledger that uses cryptography for security.

b. not issued by a jurisdictional authority or other party.

c. does not give rise to a contract between the holder and another party"(Information from the financial statements of Holdings of Cryptocurrencies – June 2019 <https://cdn.ifrs.org/-/media/feature/supporting-implementation/agenda-decisions/holdings-of-cryptocurrencies-june-2019.pdf>).

In this regard, the justification that a crypto asset is an asset requires proof. The business position is that a crypto asset is an asset. This is evidenced by the fact that, according to Crypto Currency Market Capitalization at the end of 2019, more than 2000 types of crypto assets are quoted and traded with a total capitalization of \$197,546,751,279. At the same time, many companies accept payment for their products (works, services) in crypto assets. Some of them accept payment in their cryptographic currency, for example, the restaurant chain Burger King – Whoppercoin (Restaurant Brands International). At the same time, companies' cryptocurrency can be considered as a customer loyalty program in the form of coupons, points, and other marketing developments. One of the leading bitcoin companies, Bitcoin Group Ltd., reflects bitcoins as an intangible asset. Thus, the business community defines crypto assets as a resource capable of delivering economic benefits.

In terms of the conceptual framework of IFRS, crypto assets have all the attributes of an asset, such as right, control, and expected economic benefit. The professional community, leading audit companies confirm this

position and, in their releases, designate different types of cryptographic currency as cryptographic assets, for example, YE (IFRS: accounting for crypto-assets).

At the same time, for a long period, IFRS did not regulate the issue of reporting and disclosure of information on operations with cryptographic assets, as well as the formation of their cost, classification, revaluation after recognition, reflection of operations on termination of their recognition. Thus, such problems were solved in practice based on professional judgment, and in the environment of scientific research, various assumptions were made, which may be the basis for their practical application (Korableva et al., 2018).

As options for the classification of crypto assets, studies of specialists, professional communities and leading audit companies propose the following:

- a) money,
- b) supplies,
- c) financial assets,
- d) intangible assets.

Other classification groups are considered impossible to apply due to a complete contradiction with the basic conceptual IFRS framework. However, there are cross-references to other standards related to valuation, testing for impairment, and recognition of foreign currency differences (Ziyadin et al., 2018, 2020; Akhmetshin, 2015; Bisultanova et al., 2018; Popova et al., 2019; Singareddy et al., 2019; Yemelyanov et al., 2018).

The following can be summarized in the academic papers preceding the issuance of the Committee's recommendations on the interpretation of international financial statements. Crypto assets are characterized by multiple classifications of both long- and short-term assets, as well as assets with no fixed term. Since crypto assets do not have a tangible form (Fisch, 2019; Saenko et al., 2019), taking into account the opinion of most researchers, it can be identified that this type of asset cannot be classified as, for example, fixed assets accounted for under IAS 16 "Property, Plant and Equipment", which applies to tangible items, or as investment property under IAS 40 "Investment Property", which applies to land, a building (or part thereof), or as biological assets under IAS 41 "Agriculture", which applies to biological assets (i.e., living animals or plants).

4. Data analysis and Results

The authors will conduct a comparative analysis of the procedure for the recognition of crypto assets in the industry aspect in the financial statements of the world's largest companies.

Crypto assets have many signs of cash. The rationale is that crypto assets are considered as means of payment by some companies, in particular, companies that accept digital money through special services or directly – AirBaltic, Microsoft, DELL, Whole Foods, Amazon, eBay, and others, the total number of which exceeded 50 in 2019 according to the research of the information resource 99Bitcoins (Asano, 2020). However, there is no unequivocal evidence that crypto assets are recognized as cash in IFRS financial statements. However, a precedent has been established at the level of national accounting laws where a crypto asset is considered an alternative means of payment. In particular, based on the statistical state information of Riigi Teataja, in Estonia, the right of companies to recognize crypto assets as a means of payment in the preparation of financial statements under national standards is presented:

The research by Prochazka (2018) notes that some transactions with crypto assets have signs of working with digital monetary assets. Recognition of a crypto asset as a means of payment has several advantages in terms of cost formation and subsequent revaluation following IAS 21 "Impact of Changes in Foreign Exchange Rates". However, the IFRIC concluded that crypto assets do not have cash features. At the same time, the interpretation contains a thesis that the Committee is not aware of the cryptographic currency that can be used in exchange for a particular product or service as a monetary unit. Thus, the restrained wording leaves a significant backlash for further developments in the cryptocurrency market and the expectation of perception of identification of transactions with cryptographic assets by national tax jurisdictions (Fig. 1).

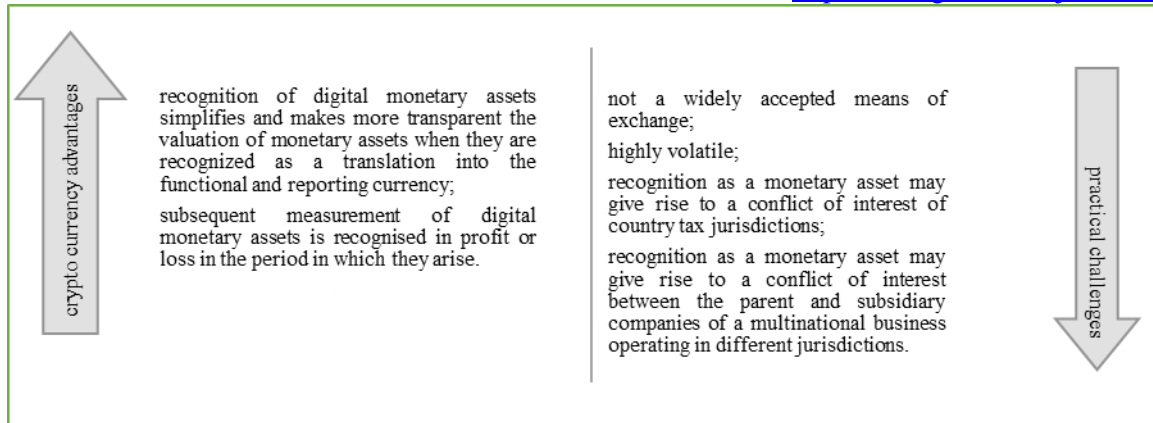


Fig. 1. Evaluation of recognition of crypto assets as digital monetary assets

Source: The authors' research

However, companies that reflect crypto assets in their financial statements explain in the comments on these statements that they do not classify them as cash or cash equivalents. In particular, the company DigitalX Ltd. in the disclosure of information describes: "Cash and cash equivalents. For presentation in the statement of cash flows, cash and cash equivalents includes cash on hand, deposits held at call with financial institutions, cash held with bitcoin exchanges, other short-term, highly liquid investments that are readily convertible to known amounts of cash and which are subject to an insignificant risk of changes in value, and bank overdrafts. Cash and cash equivalents do not include the Group's holdings of bitcoins" (Information on financial statements <https://www.digitalx.com/asx-announcements>).

Thus, despite some derogations regarding the possibility of recognizing crypto assets as digital monetary assets, this is not currently possible for IFRS reporting purposes. However, in the accounting process, this approach has several advantages for reporters and external users (Xie, 2019). In particular, such assets, despite their high volatility, can be measured under the provisions of IFRS 13 "Fair Value Measurement".

Companies that accept crypto assets directly or pay directly for goods and services provided or received without a third-party payment processor, like BitPay or Coinbase, include Overstock.com, Inc. In this case, the company Overstock.com, Inc. in the Consolidated Statement of Financial Position reflects crypto assets in the line items "Intangible assets", "Prepays and other current assets" (Fig. 2).

Assets
Current assets:
Cash and cash equivalents
Accounts receivable, net
Total current assets
•Prepays and other current assets
Property and equipment, net
Intangible assets, net

Fig. 2. Fragment content typology of the Consolidated Statement of Financial Position Overstock.com, Inc.

Source: Information on financial statements <https://investors.overstock.com/financial-information>

It should be noted that the accounting policies of Overstock.com, Inc. contain an essential provision for the next disclosures on the classification and evaluation of crypto assets. "We are an online retailer and advancer of blockchain technology. Certain assets, including long-lived assets, certain equity securities, goodwill, cryptocurrencies, and other intangible assets, are measured at fair value on a nonrecurring basis; that is, the assets are not measured at fair value on an ongoing basis, but are subject to fair value adjustments using fair value measurements with unobservable inputs (level 3), apart from cryptocurrencies which use quoted prices from various digital currency exchanges with active markets, in certain circumstances (e.g., when there is evidence of impairment)". Also, the company concludes transactions in crypto assets. Concerning this information, the following information is disclosed in the company's accounting policy: "We hold cryptocurrency-denominated assets ("cryptocurrencies") such as bitcoin, and we include them in Prepaids and other current assets in our consolidated balance sheets. Our cryptocurrencies are recorded at cost less impairment. We recognize impairment on these assets caused by decreases in market value, determined by taking quoted prices from various digital currency exchanges with active markets, whenever events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable". In its turn, the classification of crypto assets as intangible assets under IAS 38 "Intangible Assets" is an algorithm of professional judgment recommended by the International Financial Reporting Interpretations Committee. It may be noted that the established criteria are, to a maximum extent, typical of crypto assets.

One of the essential conditions is the absence of a material form (non-monetary asset), which in itself does not guarantee the classification of the object as an intangible asset. In particular, intangible items purchased initially for sale will be accounted for following IAS 2 "Inventories", which is also provided for in IAS 38. A condition for recognition of an intangible asset is its identifiability. There are two equivalent arguments. The first, if the object is separate from other assets of the organization, for example, sold, leased, exchanged for another asset, it is a confirming factor for professional judgment in recognizing the object as separate (detached). The second argument, which can be confirmed or disproved with equal credibility, is that the object must arise from contractual or other legal rights (Kucuk, 2019). Another critical confirmation of the assumption of classifying a crypto asset as intangible is that non-monetary assets do not guarantee a fixed or guaranteed amount of cash (IAS 21 "Effects of Changes in Foreign Exchange Rates"). In this regard, one can identify the main advantages and problems of recognition of a crypto asset as an intangible asset, a summary of which is presented in Fig. 3.

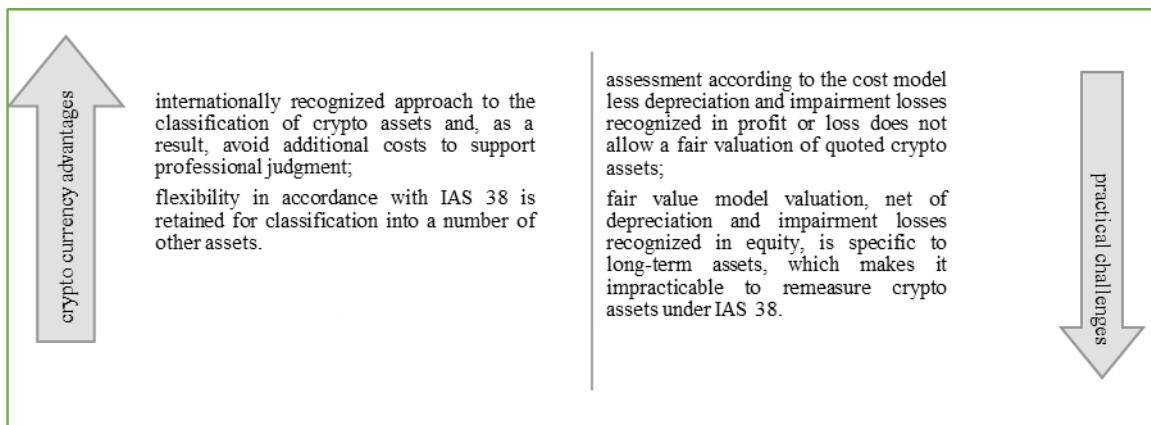


Fig. 3. Evaluation of recognition of crypto assets as intangible assets

Source: The authors' research

However, accounting policies for crypto assets classified as intangible assets have essential practical problems with valuation after initial recognition. For certain types of crypto assets, there is an active market and the prices

of such assets can be established reliably. For other types of crypto assets, the market may be uncertain. At the same time, reporting companies have the right to use the opportunity provided by IAS 38 "Intangible Assets" in respect of objects measured at fair value for which an active market in the reporting period has disappeared. Consequently, such intangible assets may then be measured at a price prevailing in the period in which the active market for such assets existed. By taking advantage of this opportunity, companies can inflate the value of their assets to achieve a specific business objective.

At the same time, the valuation of intangible assets using the fair value model provides for reflection of revaluation in comprehensive income, which is more typical for long-term assets as a maneuver to maintain financial results. The fact is that the decrease in the value of the asset will occur directly through comprehensive income, and only in the case of its shortfall, the further decrease shall be reflected in profits and losses. However, companies have the right to close capital gains by the amount of profit earned each year.

The accounting policies of the companies under study do not provide for such a maneuver, which may be adequate for the objects with a high degree of volatility. However, valuation by the cost model, net of depreciation and impairment losses recognized in profit or loss, does not provide a fair estimate of marketable crypto assets. Consequently, companies may consider dividing crypto assets into classes using different models. However, the change in the valuation model may require additional disclosures to be made with the restatement as a retrospective change in accounting policy.

A different choice of classification of crypto assets as inventory (reserves) exists in companies' practice and is supported by the recommendations of the International Financial Reporting Interpretations Committee. YE's professional judgment also provides an unqualified opinion that crypto assets may be classified as inventory under certain circumstances (Information on IFRS financial statements: accounting for crypto-assets, YE [https://www.ey.com/Publication/vwLUAssets/EY-IFRS-Accounting-for-crypto-assets/\\$File/EY-IFRS-Accounting-for-crypto-assets.pdf](https://www.ey.com/Publication/vwLUAssets/EY-IFRS-Accounting-for-crypto-assets/$File/EY-IFRS-Accounting-for-crypto-assets.pdf)). A condition of recognition is that the object is initially intended for sale rather than for use when acquired or created (production). If one extends the theoretical settings to practical situations, this is the field of mining and trading of crypto assets. At the same time, it should not be a single transaction, but a permanent basis, primary or one of the main activities.

One of the companies classifying crypto assets as inventory is DigitalX Ltd. In this case, a professional judgment on the classification of similar objects in the same circumstances in different periods is of scientific and practical interest. Consider the reporting period before the International Financial Reporting Interpretations Committee recommendations were formally issued. Crypto assets are reflected in the Bitcoins line item (Fig. 4).

Assets
Current assets:
Cash and cash equivalents
Trade and other receivables
Prepayments
Bitcoins
Total current assets

Fig. 4. Content typology of the fragment of the Consolidated Statement of Financial Position of DigitalX Ltd

Source: Information on financial statements <https://www.digitalx.com/asx-announcements>

In the explanatory notes to the financial statements, DigitalX Ltd. specifies that "Cash and cash equivalents do not include the Group's holdings of bitcoins which are classified as bitcoin inventory". The professional judgment of the company in classifying crypto assets as inventory is based on the following: "Bitcoin is an open-source software-based online payment system where payments are recorded in a public ledger using its unit of account called a bitcoin. The Group is a broker-trader of bitcoin as it buys and sells bitcoins principally for the purpose of selling in the near future and generating a profit from fluctuations in price or broker-traders' margin. The Group measures bitcoin inventory at its fair value less costs to sell, with any change in fair value less costs to sell being recognized in profit or loss in the period of the change. Bitcoins are derecognized when the Group has transferred substantially all the risks and rewards of ownership. As a result of the Bitcoin protocol, costs to sell Bitcoin inventories are immaterial in the current period, and no allowance is made for such costs. The fair value of an asset or a liability is measured using the assumptions that market participants would use when pricing the asset or liability, assuming that market participants act in their economic best interest. Bitcoin inventory fair value measurement is a Level 1 fair value as it is based on a quoted (unadjusted) market price (Bitfinex exchange) in active markets for identical assets. Bitcoin inventory is derecognized when the Group disposes of the inventory through its trading activities or when the Group otherwise loses control and, therefore, access to the economic benefits associated with ownership of the Bitcoin inventory".

Subsequently, the accounting policies of DigitalX Ltd. were partially changed after the International Financial Reporting Interpretations Committee recommendations, and the content is graphically presented (Fig. 5).

Assets
Current assets:
Cash and cash equivalents
Trade and other receivables
Prepayments
Bitcoins
Total current assets

Fig. 5. Correction in the content typology of the fragment of the Consolidated Statement of Financial Position of DigitalX Ltd

Source: Information on financial statements <https://www.digitalx.com/asx-announcements>

The company refers to digital assets as a more extended line of crypto assets – Bitcoin and Ethereum. However, the classification of crypto assets has not been changed, and they are recognized as inventory, which is measured at fair value less costs to sell. However, fair value measurement approaches have required adjustments for the following reasons: "For fair value disclosures, the Group has determined classes of assets and liabilities based on the nature, characteristics, and risks of the asset or liability and the level of the fair value hierarchy as explained below.

(a) Digital assets

Management notes that the topic of digital assets and the accounting for digital assets continues to be considered by the International Accounting Standards Board (IASB) and continues to monitor new comments and interpretations released by the Board and other standard-setters from around the world. In line with this, the Group has considered its position for the year ending 30 June 2019 and has determined that the Group's digital assets fall into 3 categories:

- Inventory method (historical method used by the Group)
- Intangible asset method (the method noted by the IASB in its most recent deliberations)
- Financial asset method (used where the digital asset meets the criteria of a financial asset)

Management notes that under the 3 methods noted above, the treatment continues to be to measure digital assets at fair value (unless otherwise disclosed) under the respective accounting standards.

(b) Fair value of Digital Assets

Digital assets (including bitcoin inventory) are measured at fair value using the quoted price in United States dollars on from several different sources, with the primary being Coin Market Cap (www.coinmarketcap.com) at closing Coordinated Universal Time.

Management considers this fair value to be a Level 1 input under the AASB 13 Fair Value Measurement fair value hierarchy as the price on the quoted price (unadjusted) in an active market for identical assets.

Management uses several exchanges, including Binance, KuCoin, Independent Reserve, and others, in order to provide the Group with appropriate size and liquidity to provide reliable evidence of fair value for the size and volume of transactions that are reasonably contemplated by the Group.

Unlisted digital assets are fairly valued using a combination of Level 2 and Level 3 techniques" (Information on financial statements <https://www.digitalx.com/asx-announcements>).

When considering the presentation of the accounting policy, taking into account the theoretical aspects of possibilities for recognition of crypto assets as inventory, the most optimal conditions are for companies that are broker-traders (Fig. 6).

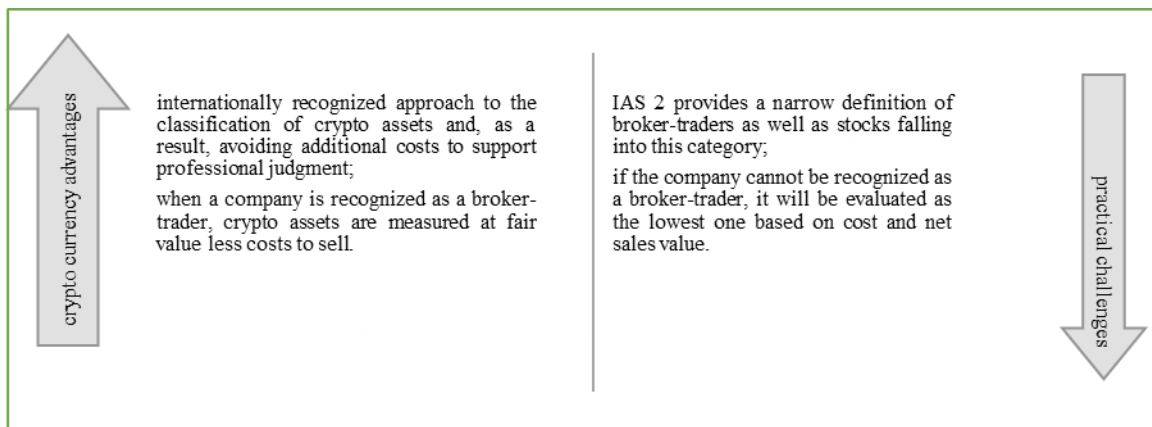


Fig. 6. Assessment of the nature of recognition of crypto assets as inventory

Source: The authors' research

Recognition of crypto assets as inventory is a sound professional judgment for companies with the main business of acquiring crypto assets for further resale. This is also supported by the recommendations of the International Financial Reporting Interpretations Committee and the practice of business in applying the classification. IAS 2 "Inventories" provides flexibility to measure inventories as the lowest cost based on their cost of production and net sales cost. However, this approach does not provide a reliable valuation for crypto assets listed in open markets because their balance cost, even if increased in the market, will not exceed their initial sale cost (Williamson, 2018). Besides, this model involves the creation of an impairment reserve and the presentation of the sales cost of the reserve less the amount of the reserve itself. The only maneuver to avoid such a valuation model is to recognize the company as a broker-trader. In this case, the inventory will be measured at fair value less costs to sell with recognition of changes in profit or loss.

It should be noted that the main obstacle to entering such a valuation model is the presentation of reasons for recognizing the company as a broker-trader, as well as the inventory belonging to this category. Concerning the recognition of inventory, the reasoning is that these items were acquired initially for sale. At the same time, they may not need or need minimal changes in their sale. Furthermore, an additional condition is the fact that for the company, this is not a single transaction, but its main activity. If all of these conditions are met, the company may recognize itself as a broker-trader, which makes it possible to measure inventory at fair value less costs to sell. In turn, when a crypto asset is recognized in the classification of a financial instrument, it is assessed as an unlikely

event by leading audit companies, as well as by the International Financial Reporting Interpretations Committee. The main argument is that a crypto asset is not cash and does not provide the holder with contractual rights. However, the research by Allen (2019) notes that a crypto asset can be an equity instrument, but only under the following condition: it must secure a contractual right to a residual interest in the net assets. From a practical point of view, when considering specific crypto-asset transactions, it is possible to identify some arguments in favor of classification as a financial instrument. However, the terms of recognition may be so unreliable that it will mislead users of the financial statements. For example, one could consider operations with a crypto asset that entitles a holder to cloud storage or a crypto asset that entitles a holder to a share of gross royalty. In the first case, for law, it is not a right to a financial asset, but a future economic benefit from the service provided, and in the second case, a crypto asset does not entail a contractual right to the residual interest in the assets.

Thus, the main arguments against the classification of a crypto asset as a financial instrument are the obstacle to recognize the crypto asset as cash, while crypto assets are not an instrument of the capital of another company and do not provide the holder with contractual rights (Fig. 7).

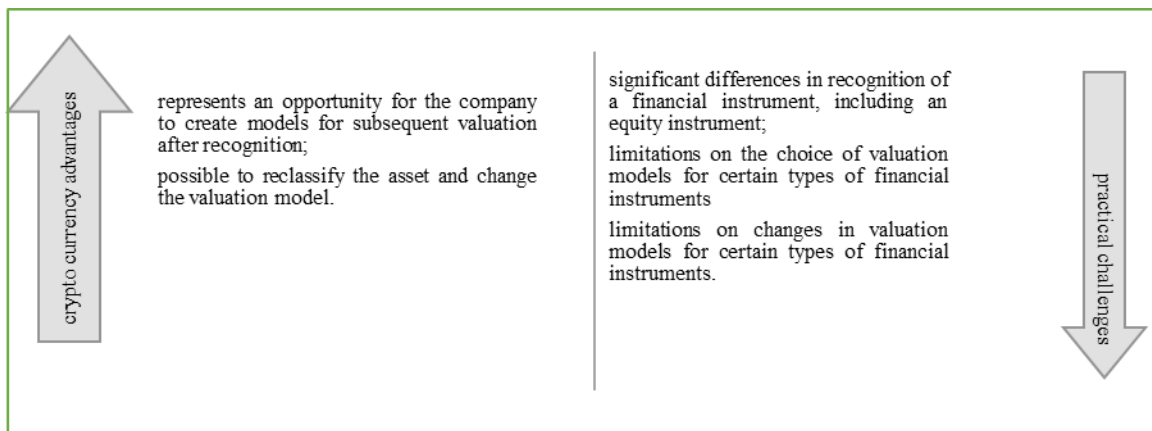


Fig. 7. Assessment of the nature of recognition of crypto assets as financial assets

Source: The authors' own research

With a higher probability, it can be argued that the current obstacles to the recognition of a crypto asset as a financial asset and, in particular, an equity instrument tend to be leveled. Improvements in the legal regulation of crypto-activity transactions are advancing more in national jurisdictions and international law, which justifies the consideration of this issue in subsequent periods, due to the emergence of other legal rights.

6. Discussion

When researching to generalize the existing approaches to the classification and evaluation of crypto assets, taking into account different scientific views, studies of the world's leading scientific centers, as well as professional judgments of audit organizations based on a comprehensive analysis of the formation of existing accounting policies of companies (Fang, 2017), to a greater extent, allow forming a conclusion about the ambiguity of the solution of these issues (Gubbi, 2013).

Multiple classifications and evaluation options, followed by reassessment after recognition of crypto assets, indicate that variability depends on several factors:

- intentions of the asset management (Zimakova, 2016);
- identification of the asset under IFRS and the recommendations of the IFRS Interpretations Committee (Patsakis, 2019);
- professional judgment on the fair presentation of information for users in financial statements (Bouri, 2017).

Generalization of practices, analysis of the best and most reliable models for assessing crypto assets can be a determining factor in choosing the accounting policy of the company, as well as determining further directions for improving their accounting and presentation of information in financial statements.

One of the most transparent models for classification, measurement, and disclosure in financial statements is the model for managing the value of crypto assets when classified as a digital monetary asset (Aste, 2019). The model of recognition of a crypto asset as a digital monetary asset could be used by companies that accept crypto assets directly or pay directly for goods or services rendered or received without the involvement of a third-party payment processor such as BitPay or Coinbase, which performs an instant conversion (Beck, 2017; Pujiyono et al., 2019).

In this case, a digital monetary asset is an asset that is used in exchange transactions for goods or services as a unit of calculation. The valuation approach will be equivalent to a currency other than the functional or reporting currency (Fig. 8).

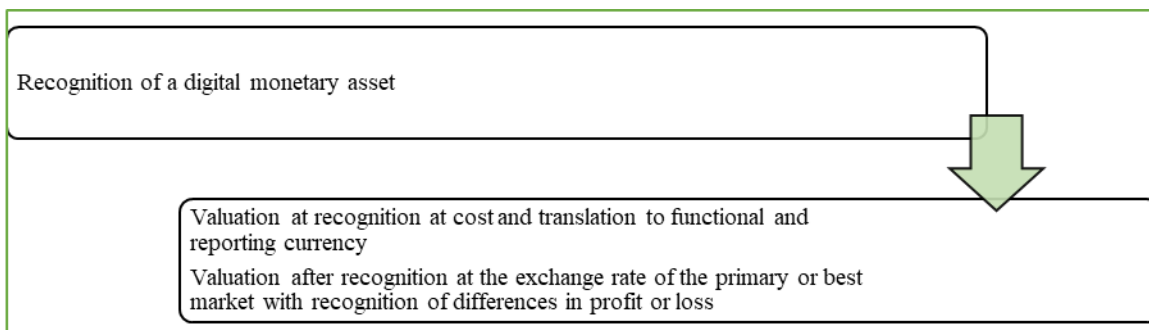


Fig. 8. Prospective approach to the formation of a digital monetary asset valuation model

Source: The authors' own research

Thus, this model is not concerned with the recognition of crypto assets as cash or cash equivalents (Buchmann, 2016), but rather with a proposal to use best accounting practice in recognizing and measuring this type of asset (Fisch, 2018), if it is considered by management as an asset that is used in transactions for exchange of goods or services as a unit of calculation (Boreiko, 2019). If the recognition of a crypto asset as a digital monetary asset represents a remote prospect for the possible application of such a model in practice, then another set of models is already proven.

Conclusion

The recognition of a crypto asset in a classification requires the company to choose a model for its subsequent valuation. In practice, the most actively used models are those for measuring crypto assets at fair value. Companies that identify themselves as brokers-traders are in a rather advantageous position in the current practice (Xie, 2019). When classifying crypto assets as inventory, brokers-traders measure them at fair value less costs to sell. An analysis of the accounting policies of some companies that identify themselves as brokers has shown that companies directly in the disclosure of information inform users of the financial statements that the cost of sale is insignificant (Driouchi, 2018).

Therefore, the amount at which crypto assets are measured at fair value less costs to sell approximates their fair value. Since crypto assets are reflected as short-term (or current assets), i.e., are not long-term investments, their revaluation is reflected in profit or loss without accumulating value gains in equity through other comprehensive income (Frick, 2019). This valuation model is a correct reflection of the market (stock) price of an asset. Users of financial statements can obtain information about fair value hierarchy for certain types of cryptographic assets,

and if it is level 1, the source data can be publicly confirmed (Kosolapova, 2019). Thus, in the authors' opinion, this valuation model is in line with information requests from both the users of the financial information and the management of the reporting entity.

The valuation models considered are, in fact, asset value management models as a business model for achieving a business objective. If, in theory, restrictions on the use of a business model at fair value through profit or loss and, accordingly, at fair value through profit or loss through comprehensive income are not taken into account, then the sophisticated approach may be taken as variability. This variability allows the reporting organization to select a business model for the assessment of a crypto asset based on its professional judgment. The choice of a fair value model with changes in profit or loss will affect the performance. The choice of a valuation model for a crypto asset based on fair value with changes recognized in comprehensive income will have an overall impact on the cost of equity. However, if it is envisaged to write off the capital gains to the financial result, it is possible to extend the model to the level of the business model with the allocation of changes in profit and loss. It should be clarified here that this approach is a variation of solutions.

However, the proposed models provide for the development of a methodology for the evaluation of crypto assets. The methodology should contain a comprehensive approach to different types of crypto assets based on publicly available information classified by risk. In order to develop their model for managing the value of crypto assets, companies will need to take advantage of deviations from general accounting rules and the presentation of specific professional judgment. IAS 1 "Presentation of Financial Statements" provides for such opportunities, but only if compliance with the established rules will mislead users of financial statements. The exercise of particular professional judgment and deviating from the standard IFRS rules requires the reporters to disclose such information, which is a time-consuming process, as it involves recalculating the impact on each reporting item affected by the change. Prospective models for managing the value of crypto assets were formulated based on the best practices of crypto asset classification and evaluation, depending on the intention of the company management to use them (Fig. 9).

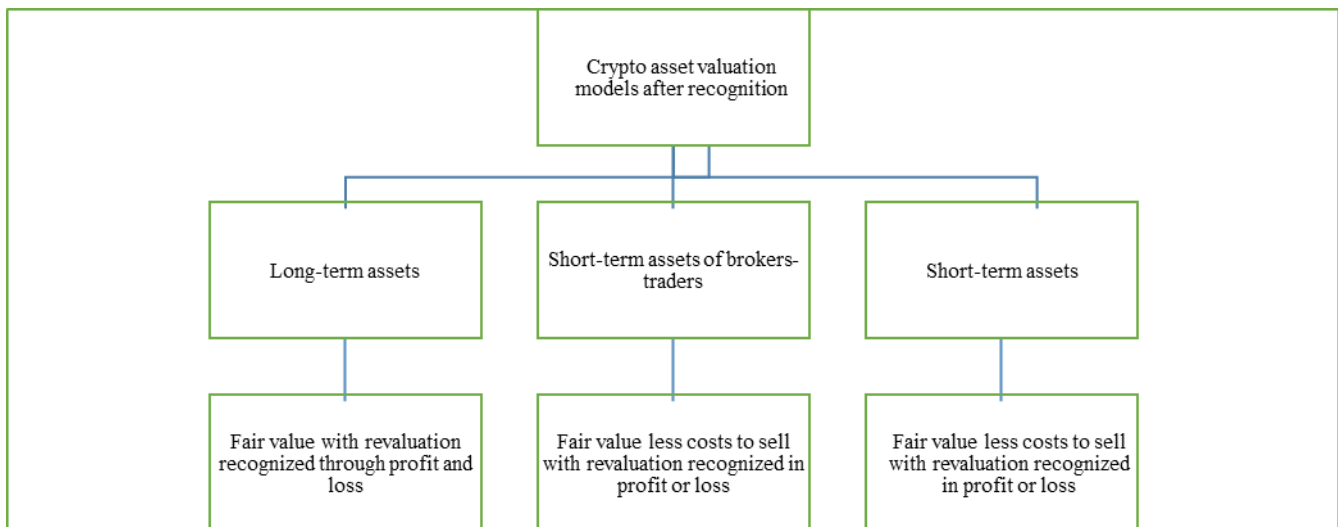


Fig. 9. Development of prospective models for managing the value of crypto assets after their initial recognition

Source: The authors' own research

It should be noted that the existing models for recognition and valuation of crypto assets as a means of payment, financial asset, intangible asset, and inventory have many peculiarities in the formation of accounting policies. However, there is no standard that is wholly correct for the accounting and presentation of information in financial statements. Each standard was primarily designed to recognize and disclose information of objects close to crypto assets in their essence, to which crypto assets are indirectly related. However, the current practice of

applying classifications and assessment of crypto assets by business proves the flexibility of accounting policy for the most accurate presentation of information about these objects in financial statements.

At the same time, companies are forced to present a reasonable professional judgment confirming the validity of the presented position. This is, to a greater extent, the rationale for revising the existing approaches to the classification and measurement of crypto assets in International Financial Reporting Standards. The authors believe that the way out for leveling the conflict of business interests and the current rules of IFRS is to refine the existing standards, introducing rules for the classification and evaluation of crypto assets. The authors also do not exclude that the best solution is to develop a new IFRS standard for accounting of crypto assets.

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Tatiana MOROZOVA, Associate Professor, Department of Accounting and Taxation, Plekhanov Russian University of Economics, Russian Federation. Research interest: International Financial Reporting Standards, Taxes and taxation, Small Business Accounting. ORCID ID: <https://orcid.org/0000-0003-3833-2783>

Ravil AKHMADEEV, British Doctor of Philosophy degree (PhD) standard, Associate Professor, Department of Accounting and Taxation, Plekhanov Russian University of Economics, Russian Federation. Research interest: Taxes and taxation, Transfer pricing in taxation, International taxation, Finance and credit, Tax regulation of the economy. ORCID ID: <https://orcid.org/0000-0002-7526-0144>

Liubov LEHOX, CPA, MIATI GL and VAT Accountant RLG Europe B.V. (Swiss Branch), Switzerland. Research interest: International Financial Reporting Standards, Taxes and taxation, Small Business Accounting. ORCID ID: <https://orcid.org/0000-0001-6081-5808>

Alexei YUMASHEV

Doctor of Medicine, professor, Department of Prosthetic Dentistry, Sechenov First Moscow State Medical University. Research interests: Business, Management and Accounting Economics, Econometrics and Finance, Social Sciences, Chemistry Dentistry, Medicine, Computer Science, Pharmacology, Toxicology and Pharmaceuticals, Environmental Science, Chemical Engineering. ORCID ID: <https://orcid.org/0000-0002-5184-0195>

Galina MESHKOVA

PhD, Candidate of Economic Sciences, Associate Professor, Department of Innovative Entrepreneurship, Bauman Moscow State Technical University. She leads the research work and practical training of students. Research interests: sustainable development of territories, innovations, technological and social business, investment, business valuation, economic security, corporate finance and international accounting. ORCID ID: <https://orcid.org/0000-0002-3795-0830>

Marina LUKIYANOVA

Associate Professor, Department of Public Financial Control, Financial University under the Government of the Russian, Federation, Moscow, Russia. Currently engaged in teaching public finance, government efficiency, anticorruption policy disciplines at the Faculty of Public management and Financial Control Financial University and research in the field of public management and controlling of public property. Has an expertise on strategy for the city development and programs in sport infrastructure, project manager of several scientific studies (grants). Research interests: public management, public finance, government control systems, digital economy, block-chain technology. ORCID ID: <https://orcid.org/0000-0003-2028-8542>

Register for an ORCID ID:

<https://orcid.org/register>

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HEALTH TOURISM IN LOW MOUNTAINS: A CASE STUDY

Alexandr N. Dunets ^{1*}, Veronika V. Yankovskaya ², Alla B. Plisova ³, Mariya V. Mikhailova ⁴,
Igor B. Vakhrushev ⁵, Roman A. Aleshko ⁶

¹Altai State University, Lenin Ave., 61, 656049, Barnaul, Russian Federation

²Plekhanov Russian University of Economics, Stremyanny lane, 36, 117997, Moscow, Russian Federation

³Financial University under the Government of the Russian Federation, Leningradsky Prospekt, 49, 125993, Moscow, Russian Federation

⁴Sechenov First Moscow State Medical University, Trubetskaya st., 8-2, 119991, Moscow, Russian Federation

⁵V.I. Vernadsky Crimean Federal University, Prospekt Vernadskogo 4, Simferopol, 295007, Russian Federation

⁶Northern (Arctic) Federal University, Severnaya Dvina Emb. 17, 163002, Arkhangelsk, Russian Federation

E-mails:^{1*} dunets@mail.ru;

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Abstract. Health tourism is a specific type of tourism with great prospects. Most people do not have time for long trips, but there is a great need for a change of scenery and restoration of strength. There are many examples when in the regions in order to improve health and relaxation, nearby areas are being developed. It is most promising to create programs for such tourism near existing resorts that have the necessary infrastructure and medical facilities, while individual client requests must be taken into account. It is proposed to research health tourism as a territorial tourist complex, which includes not only specialized infrastructure but also territories adjacent to resorts. It is noted that low-mountain areas have the most suitable spaces for tourism development. By the example of the Belokurikha resort, the goals of visiting and tourist satisfaction are identified, as well as the possibilities of developing health tourism. A model for designing individual programs for health tourism is proposed.

Keywords: health tourism; medical tourism; low-mountain areas

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1. Introduction

Health tourism has a long history. Its formation is based on the use of medical resources and the use of medical procedures. Health tourism consists of disease prevention, including specific disease prevention and Wellness tourism, and medical tourism, which includes surgery and treatment of diseases. Many medical resorts were

created in low mountains. This is due to the presence of mineral waters, clean air, the landscape attractiveness of the mountains and a favorable climate.

Currently, it is required to take a fresh look at the old forms of organization of treatment and rest on the basis of sanatoriums. New trends are increasing the requirements of consumers of services to the quality of service, reducing free time on vacation, the search for such programs that can diversify and personify relaxation and treatment. It is important to take into account the needs of tourists and promote the development of health tourism, which will make it possible to diversify segments of tourists and increase tourist flows in traditional health resorts. It is relevant to identify what opportunities existing sanatoriums and resorts have in connection with the development of health tourism in the adjacent territory. For this, it is necessary to identify the features of the organization of this type of tourism and the needs of tourists (Goryushkina et al., 2018, 2019; Ozen and Grima, 2018; Almeida et al., 2019; Singgalen et al., 2019; Chehabeddine, Tvaronavičienė, 2020; Caurkubule et al. 2020).

Many old resorts have the image of places where they treat pensioners and people after serious illnesses. Sanatoria have the opportunity to provide a new list of services and more successfully develop health tourism. Since most modern people are stressed, they have poor health and need to change their environment.

Due to the fact that the development of health tourism is based on the creation of centers with specialized infrastructure (sanatoriums, medical centers), it becomes necessary to analyze existing examples of territorial tourist complexes. The Belokurikha resort, the largest resort in the Asian part of Russia located in the low mountain zone, can be used to study and simulate the current state of the services offered and the possibility of the emergence of new programs for health tourism.

2. Literature review

Health tourism is a market of almost half a trillion dollars, accounting for 14% of the total global tourism revenue. Health tourism has traditionally been an important and popular type of tourism in Russia. Various and numerous natural healing factors, a well-developed network of sanatorium and resort organizations, training of medical personnel, and the scientific substantiation of balneologists are the basis for further development (Tourism in Russia: A Management Handbook..., 2015).

The development of health tourism and medical tourism in modern practice is often associated with the SPA industry. These are wellness programs consisting of special hydrotherapy procedures using mineral or fresh water combined with the healing effects of therapeutic mud, algae, plant products and other components of natural origin.

The Annual Medical Tourism Report presents the range of treatment options available to potential tourists and includes: cosmetic surgery; dentistry; cardiology/cardiac surgery; orthopedic surgery; stomach treatment; reproductive system; organ, cell and tissue transplantation; eye surgery; diagnostics and screening (Lunt *et al.* 2019).

According to the UNWTO definition (UNSD and UNWTO, 2008), health tourism includes services that vary widely from visits to spa centers to surgical operations (Vetitnev *et al.*, 2012). Hajioff (2007) defines this concept as a trip to other countries or territories for the purpose of acquiring medical and related health services, which is close to the concept of medical tourism.

Vetitnev (2012) defines health tourism as part of a tourist activity that involves, as the main motive for travel, obtaining by tourists a complex of curative, diagnostic, rehabilitation, preventive and recreational services

provided in areas other than their place of permanent residence and having the necessary natural, material and human resources to prevent diseases or treatment. Wellness tourism is distinguished by the fact that consumers of services have the main motive – preserving and strengthening their health, preventing the disease, and not its treatment (Muller, and Lanz Kauffman, 2001).

Health tourism suggests that tourists receive the medical and recreational services provided in areas with natural resources as the main motive for the trip. Various aspects of the development of health tourism are reflected in the publications (Health & Wellness Tourism... 2009; Vetitnev, 2012; Lautier, 2014; Sandberg, 2017 *et al.*). Health tourism consists of two main parts. The first is disease prevention, which includes specific types of disease prevention and wellness tourism. The second component is medical tourism, which includes surgery and treatment of diseases (Typology of Tourism..., 2008).

Health tourism is a combined type of tourism and includes two components: medical and recreational. In this regard, health tourism has an expanded segment of tourists; these are both people with diseases and various categories of tourists who can be classified as conditionally healthy. In addition to the use of infrastructure and medical resources, health tourism has an extra function – recreational, associated with the active movement of tourists in the areas adjacent to the resort (Watkins et al., 2018; Yemelyanov et al., 2018; Trofimova et al., 2019; Prodanova et al., 2019). For example, in the territories adjacent to the resort, terrains are arranged using mountainous terrain. At the intersection of hiking trails, parking with food and rest points is created, places for heliotherapy are determined taking into account the microclimatic features of the area. The implementation of tourist programs in the natural environment allows vacationers to observe birds, animals, plants, get acquainted with the geological features of the territory. In organizing such tourism, traditional wellness treatments (saunas, massages, herbal teas, salt) and therapeutic exercises (for example, oriental areas such as wushu, yoga) can be widely used.

The target segments of health tourism can be various groups of tourists, not only having diseases but also healthy people who want to get a healing effect from tourist resources and implemented medical technologies. This type of tourism makes it possible to realize the functions of recreation associated with the restoration of physical and emotional strength (Pavlov, 2017; Voronkova et al., 2019; Zeibote et al., 2019; Mullakhmetov et al., 2018; Bernardi, 2019).

At present, the work of the organizers of health tourism on the development of anti-stress programs enjoys particular success and prospects for further development (Sharafutdinov et al., 2017, 2019; Nelyubina et al., 2016; Kolupaev et al., 2019; Feofanovich, 2019). It is stress that largely contributes to the development of a number of diseases; therefore, the creation of such programs for healthy people is especially important. As a rule, they are short (two to three days) and include hiking trails and wellness treatments.

The use of surrounding natural resources is one of the necessary conditions for the development of health tourism, in connection with which they are subject to special requirements, including the preservation of the environment, the absence of a pronounced anthropogenic load. It is the presence in natural conditions and the positive impact of climate, forest resources, and landscape features that largely contribute to stress relief, positive mood and general recovery of the tourist. Low-mountain areas are particularly suitable for this. The attractiveness of foothill and low-mountain regions is determined by a favorable climate and most often by good transport accessibility.

Natural factors act as a basic basis for the development of tourist activities in any territory (Ghosh and Ghosal, 2019; Korableva et al., 2018). In some forms of tourism, they are of paramount importance – therapeutic and health-improving recreation (mineral waters, mud, landscape and climatic conditions); in others, they are relegated to the background and form only the environment for development (for example, excursions) (Oborin, 2011). The complex of natural healing resources of health tourism includes geological and geomorphological,

climatic, aquatic, biological, faunistic and floristic resources (Mirzekhanova and Koltsova, 2013; Ziyadin et al., 2018; Madiyarova et al., 2019; Rahman et al., 2017).

The nature of the surface of the territory is of paramount importance in the differentiation of the territory for health tourism. Its elevation above sea level and the strong ruggedness of the relief determine the exceptional variety of properties and objects of the natural environment.

With an increase in absolute height, the characteristics of the living environment of organisms quickly change within small distances and have a great impact on life support processes. In the mountains, there is a high-altitude interval of ecological optimum for the life and activity of people (Suprunenko, 2003).

The main characteristics of the relief are the absolute and relative height. For the development of health tourism, it is advisable to use territories with absolute heights of up to 2 thousand meters, as excessive effects on the human body arise above. However, there are examples of resorts located at an altitude of 3 thousand meters (for example, in the Pamirs). In this case, the treatment uses the special natural conditions of the area (clean air and its ionization, atmospheric pressure, oxygen and ozone, etc.).

The main most comfortable relief parameters for health tourism purposes include the following: absolute height – 1000 m; slope steepness – 0-10°; surface substrate – pebble, sand, loam; depth of snow cover – 0-20 cm; condition of the snow surface – dry, crumbly snow; gentle forms of the surface with the presence of landscape places, rocks. Bredikhin (2004) identified criteria for assessing the influence of relief on the formation and functioning of various types of territorial tourism systems. Among others, he identified a therapeutic-recreational type that has three subtypes: climatic, mud and balneological. In the mountains, humidity is reduced, air ionization and solar radiation are increased, which has a beneficial effect on various body systems. Of particular importance for health tourism are the properties of the substrate, the hydrogeological and geochemical characteristics of the territory (the chemical composition of mineral waters and muds, their reserves, flow rates, the nature of occurrence and outcrops to the surface, etc.).

3. Methods

Due to the fact that health tourism is a combined type of tourism, a system-integrated approach to research can be used to identify its development. Preobrazhensky (1975) proposed the use of a systematic approach to the study of tourism in Russia. From the economic point of view, the territorial tourist system in the region is the territorial health tourism complex. Krotova (2003) notes that when the tourist complex is formed, intersectoral relations develop.

The existence of health tourism involves the development of the relationship between medicine and the tourism sector. Medical centers with specialized infrastructure should take into account the needs of tourists and use tourism resources.

The sociological method is important to identify the needs of tourists, which are the basis for the functioning of the territorial tourist complex. Questionnaires and surveys help to identify tourist satisfaction with the services provided and needs for new services (Kim, Bahlaitner, 2006).

Territorial health tourism complexes are urban education formations of the medical and recreational functional profile, consisting of institutions united by a single architectural and planning solution, a common spatial composition and organization of services. Tourism complexes are not only buildings, structures, other artificial and technical objects but also the territory itself with all the features of its natural landscape. Therefore, in Russia, there are such concepts as a resort protection zone or a health-improving area (Federal Law No. 26-FZ "On Natural Healing Resources...", 1995). These territories belong to special categories of lands that are used to organize the treatment and recreation of citizens. The value of such territories lies in the location of certain natural resources on

them in the form of mineral waters, mud, and in some cases even the climate (mountainous, forest) has a healing effect.

In the territorial and functional aspects, the tourist complex is understood as the corresponding infrastructure or network of tourist and recreational organizations located in territories of different levels. The level of infrastructure development of the tourist complex is characterized by: network development indicators (number of organizations and their capacity); the amount of costs for the development of the network (the number of labor resources); the achieved level of social security (Lukyanova, Tsybuh, 2004).

In the tourist complex, one can distinguish medical institutions that provide medical services to tourists and are the basic elements of health tourism. The special attention is required to the laying of roads and a network of tourist routes near a medical center (resort) in mountainous terrain. This will make it possible to successfully use the territory for health tourism (Fig. 1).

The health tourism complex can be represented in the form of blocks:

- natural resources (primarily climatic, orographic, hydro-mineral, landscape);
- specialized, including medical facilities (motels, clinics, medical centers, etc.);
- tourist and recreation, which includes tourist and hotel enterprises, as well as providing wellness services, organizing excursions and simple trips;
- the management unit provides planning, regulation, coordination and control of the development of enterprises of the tourist complex;
- the production unit provides materials, equipment, food, includes utility networks, engineering infrastructure, and transport;
- social service includes organizations and institutions that provide health tourism consumers with social services (trade, catering, social services, culture and art, science and education, entertainment, information support, communication) (Dunets, 2019).

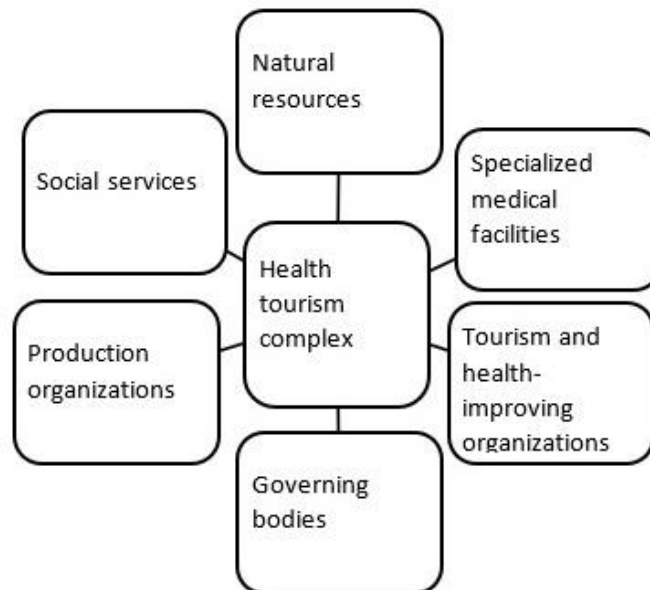


Fig. 1. The structure of the territorial health tourism complex

Source: own research

4. Results

The authors have examined the experience of developing the health tourism complex in the low-mountain part by the example of the Belokurikha resort, which is the largest resort in the Asian part of Russia, located in the Altai Mountains. Observations of local residents over the positive influence of warm mineral water contributed to the fact that in 1866, the first bath was set up and treatment was organized, and then a special treatment room was created. In 1916, the first sanatorium was built. In 1960, many new sanatoriums were built: Centersoyuz, Altai, Katun, Russia, Siberia, children's sanatoriums of the Ministry of Health, a radiation therapy center with 80 baths, ZapSib Rodnik, Gornyyak sanatorium. In the late 1980s, more than 50 thousand people annually underwent treatment and rehabilitation courses in the sanatoriums of the Belokurikha resort, the resort had a status of national importance. Currently, the resort area of Belokurikha is an independent part of the city of Belokurikha, which stretches along the valley of the river of the same name. The resort has 22 major sanatoriums with a total capacity of about 4.5 thousand beds. More than 240 thousand tourists rest at the resort annually (246 thousand in 2019). About 4300 people work at sanatoriums. Such data are provided by the Altai Territory Administration for the Development of Tourism and Resort Activities. The resort has developed mainly the service sector; there are various specialized institutions, as well as ski slopes. Currently, Belokurikha is gaining fame not only as a resort city but also as a venue for major events. The population in the resort city in 2019 is 36.6 thousand people, including 17.9 thousand people of working age (Demographic Yearbook of the Altai Territory, 2019). A feature of the territory of Belokurikha is its location at the junction of the plains of Western Siberia and the Altai Mountains. The area has a dissected low mountainous terrain. Absolute elevations range from 450 m to 845 m. Relative heights are 100 m or more. Belokurikha has favorable conditions for the formation of a layer of warm air in the cold season, as a result of which this territory is characterized by less severe winters and a longer frost-free period, in comparison with the plain part of the region. The average air temperature in January in Belokurikha is -16.8 °C, while in Biysk, 75 km to the north, it is -18.2 °C, and in the neighboring mountainous part of Altai, it is -17.5 °C. The average air temperature in July in Belokurikha is +19.2 °C.

The moistening mode of the territory is due to the presence of the “barrier effect” mechanism, due to which, when the air masses rise along the slopes, a greater amount of precipitation occurs compared to the plain spaces. In Belokurikha, the precipitation is up to 700 mm. The amount of solar radiation received is quite significant – more than 100 kcal/cm² (more than 4200 MJ/m²) per year. The duration of sunshine is an average of 1925 hours per year, and often it reaches 2100 hours per year. In Belokurikha, the longest warm period is observed – 201 days with a minimum duration of cold compared to neighboring regions (Kharlamova, 2013). The water body used for recreational purposes is the Belokurikha River. The larger Peschanaya River is 10 km from the resort. The resort uses sulphide-silt therapeutic mud from the lakes of the Altai Territory. Siliceous thermal radon-containing waters predominate (Belokurikha deposit with thermal nitrogen-siliceous radon-containing waters, with a temperature from 30 °C to 42 °C) (Revyakin, Pomorov, Vdovin, 1997). Mineral drinking water is used both from local sources (Belokurikhinskaya Vostochnaya No. 2) and imported from the foothills of Altai – therapeutic-table water Zavyalovskaya. The largest organization in Belokurikha is JSC “Resort Belokurikha” including the sanatoriums Belokurikha, Siberia, Katun, a resort clinic and also other facilities. Large sanatoriums “Altai West”, “Russia” and “Transsib” are successfully developing. The resort is characterized by a lack of additional infrastructure aimed at young people, an insufficient number of clubs, shopping and entertainment centers. Additional infrastructure is presented by restaurants and cafes that fully satisfy the needs of tourists. 3-4-star hotels are also mainly located in the resort area. The low-level hotels, guest houses, hostels are located on the periphery. There are a large number of playgrounds in the sanatoriums. The application of sociological analysis of various types of tourism activities associated with health allows identifying tourist preferences and the degree of satisfaction from recreation, treatment, recreation and entertainment programs, etc. The most accessible sociological method is a survey of tourists vacationing in sanatoriums. The profiles of 1700 tourists vacationing in Belokurikha (Sanatoria Belokurikha, Katun, Siberia) were analyzed. The main purpose of staying at the resort is to receive specialized treatment (32%) and rehabilitation and prevention (24%); to a lesser extent, tourists are interested in outdoor activities (10%) and

relaxation (7%). Most of all sanatorium vacations are chosen by workers (28%), office workers (21%) and pensioners (19%). In general, 97% of respondents are satisfied with the prescribed course of procedures, attentiveness and professionalism of medical personnel, as well as the quality of service. As for the related services, only 88% are satisfied with the entertainment programs, 86% – with sporting events and 68% – with the organization of children's leisure. Based on the foregoing, the sanatorium copes with the provision of services in the field of treatment, rehabilitation and prevention, but there is a lack of cultural events, programs for outdoor activities, relaxation, etc. (Figures 2-5).

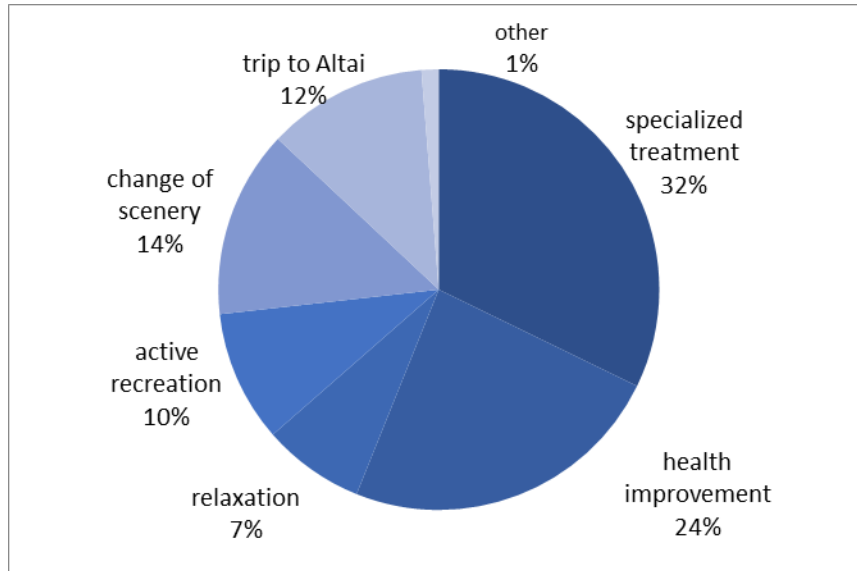


Fig. 2 Purpose of visiting the Belokurikha resort

Source: own research

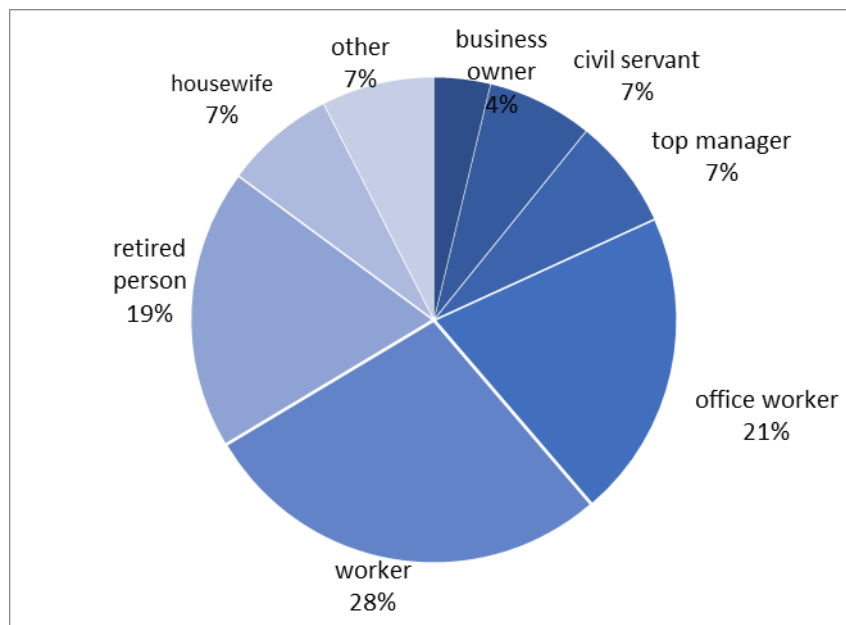


Fig. 3 Professional status of interviewed tourists

Source: own research

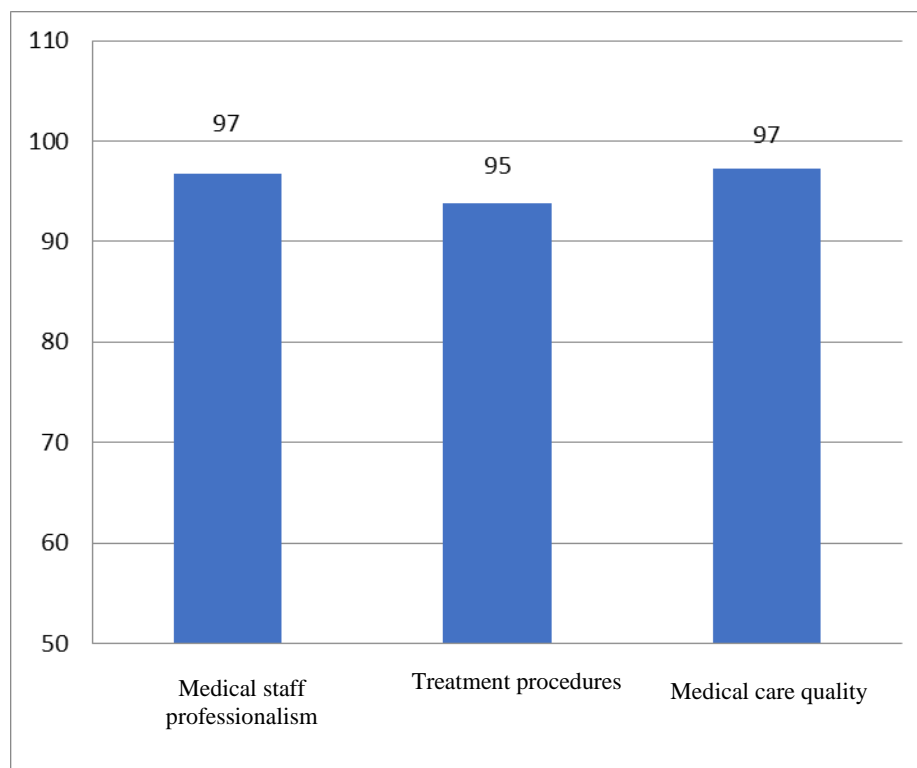


Fig. 4 Satisfaction with medical services

Source: own research

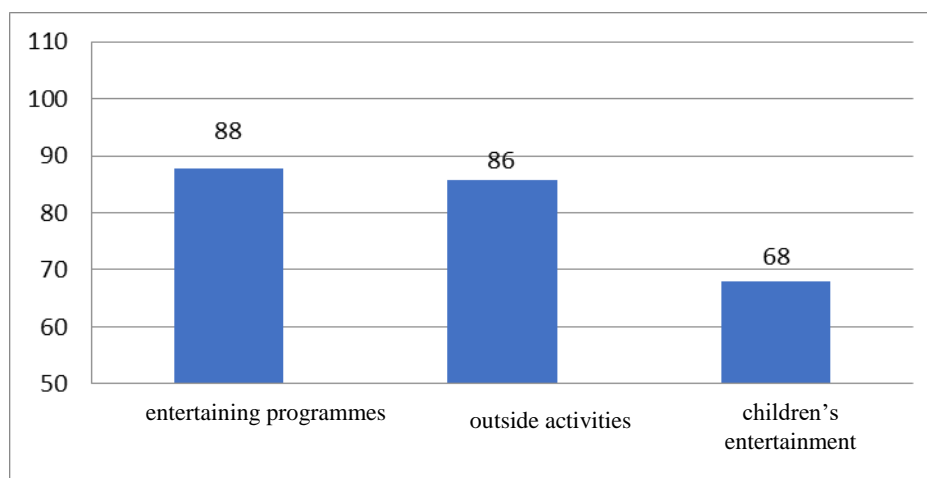


Fig. 5 Satisfaction with additional relaxation programs

Source: own research

Currently, several facilities have been created in Belokurikha providing components in health tourism and complementing the medical services of sanatoriums. They are popular with resort guests: a wellness center with a pool and water attractions; “Siberian Compound”, including a recreation area, a museum, a hippodrome and stables; “Belokurikha Village”; a complex in the Russian style “Altai Gold” with Sandunov Bath Houses; “Forest Tale” in a secluded place where one can communicate with pets; “Altai Valley” sanatorium at a small distance from the resort.

Health tourism is of interest to the government and business. The development of health tourism involves the development and implementation of innovative types of partnerships among stakeholders, specific management models. In other words, it is necessary to develop a mechanism for the formation of public-private partnerships in the development of health tourism (Chistobaev et al., 2019; Shevyakova et al., 2019). An example of this was a project in a low-mountain area near the resort of Belokurikha, which was practically not used for tourism. The creation and development of the Belokurikha 2 Gornaya project and financial support from the federal target program “Development of Domestic and Inbound Tourism in the Russian Federation” made it possible to create transport and engineering infrastructure. Hotels and entertainment facilities are being created here, there are horse riding and hiking trails (terrain cure). The concept of the Belokurikha 2 Gornaya project provides for the construction of a resort complex with 3,000 beds, including hotel buildings of low floors, catering facilities, sports and recreational facilities, a fair area with retail pavilions, a spa clinic, a physiotherapy clinic, a balneotherapy center, an aesthetic medicine center, a wellness park, and a beach area with a water park. Belokurikha 2 Gornaya will be able to receive more than 200 thousand tourists a year.

The analysis of the state and development prospects of Belokurikha as a health tourism destination revealed their territorial structure:

the area of the enterprise (sanatorium, medical center, etc.) is a health tourism center;

the walking area within the village is a tourist center (resort);

the area of terrain cure and hiking routes;

the zone of nearby routes to tourist resources (for example, lakes);

the border zone of tourist destinations (borders are blurred and change over time, and also “pulsate” depending on the season of the year).

The development of these zones is determined by new opportunities for the resort, which are associated with the expansion of tourism segments and an increase in tourist flow.

For the development of health tourism, the tour organizer needs to understand how various services or types of medical procedures (therapies) can interact, comprehensively influencing the human body. Personalization of programs consists in the selection of medical and physiological factors for a particular person, which in reality is difficult to implement. Nevertheless, it is advisable to segment the tourists, offering them the appropriate leisure program package.

The creation of health tourism programs can be based on the hierarchical principle of recreational design by Kvartalnov and Zorin (2001). This can be represented as a combination of recreational activities (targeted, additional, attendant), depending on the main characteristics of tourists, due to their level of health (Fig. 6) (Kvartalnov *et al.*, 2001). Targeted recreational activities should include therapeutic methods and influence on the human body. Based on a combination with additional recreational activities, as well as related services, individual health tourism programs are formed.

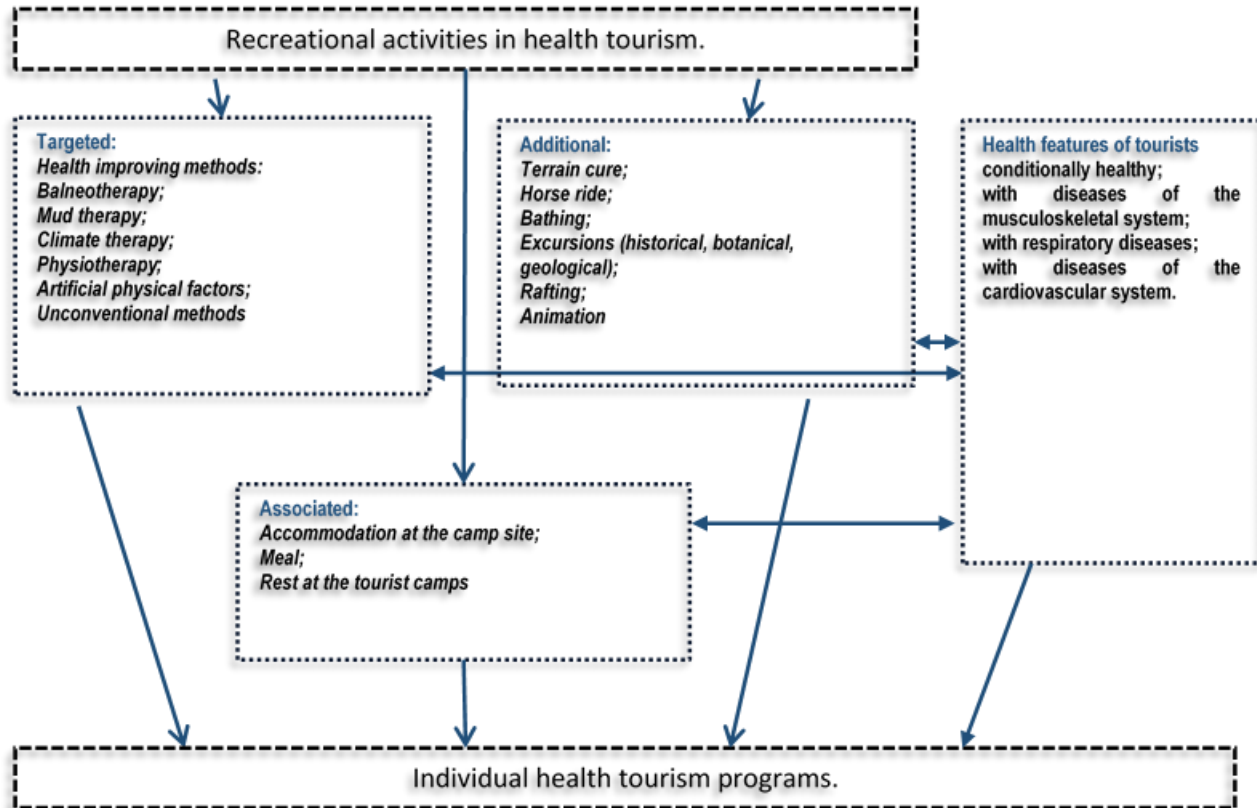


Fig. 6. Types of recreational activities used in the formation of individual health tourism programs

Source: own research

5. Discussion

Natural and territorial features determine the possibilities for the development of health tourism (relief and landscape, climatic comfort, the availability of minerals used for therapeutic purposes). The special infrastructure that provides medical services, accommodation for tourists, as well as with their movement by vehicles, determines the prospects of health tourism.

When assessing the territory, it is necessary to take into account not only the absolute height of the terrain but also the degree of dissection of the relief, which is characterized by the depth and density of the dissection, as well as the steepness of the slopes. For health tourism purposes, a large-hilly or low-mountain undulating relief is most favorable. The flat surface is aesthetically less expressive and unfavorable for tourist activities. The characteristics of the terrain are especially important when laying the terrain cure routes. They are a prerequisite for the functioning of modern resorts, as they are used to train the cardiovascular system, musculoskeletal system, and respiratory system.

Conclusions

Thus, health tourism is characterized by combined elements in the tourism program, and therefore these programs are selected individually (personalization of leisure), taking into account the level of health of tourists. In this case, the medical element is required for the organization of this type of tourism. Therefore, health tourism is concentrated near sanatoriums and medical centers.

Allowance for the needs of tourists and the development of health tourism will make it possible to diversify segments of tourists and increase tourist flows in traditional health resorts. It is relevant to identify what opportunities existing sanatoriums and resorts have in connection with the development of health tourism in the adjacent territory.

Health tourism includes elements of tourist routes that are aimed at restoring the physical, emotional and psychological strength of a person. Tourism programs may include edutainment and sports elements.

The influence of natural environmental factors on the health and livelihoods of people is obvious. For the implementation of health tourism, the presence of certain properties of the territory is required, allowing the most efficient implementation of the healing and treatment processes. These include a set of natural factors: orographic, climatic, water, balneological (mineral springs, healing mud, etc.), etc.

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Alexandr N. DUNETS

Doctor of Geographical Sciences, Professor, Dean of the Faculty of Geography of Altai State University. Research interest: sustainable development of tourism, ecology and environment, functional zoning, mountain region, tourism, the Altai-Sayan Mountains.

ORCID ID: <https://orcid.org/0000-0002-3804-6800>

Veronika V. YANKOVSKAYA

Candidate of Economic Sciences, Associate Professor, Plekhanov Russian University of Economics (PRUE): Department of Psychology. The editorial expert of the portal Seychas.ru news stories from the field of economics and management since 2017. She has the professional experience of a consultant: Specialist of the strategic analysis department of Volga-Dnepr Airlines; Expert, Consulting Department, Unicon; Analyst, Department of Federal and Regional Programs, Compulink. Research interests: Reforming the systems and structures of enterprise management. Development and implementation of the strategy. Problems of theory and practice of management, management development model. Humanization of labor of teaching staff (effectiveness and efficiency of teaching staff. Capacity of teaching staff). Information Security.

ORCID ID: <https://orcid.org/0000-0003-3614-2169>

Alla B. PLISOVA

PhD in Economics, Associate Professor, Department of State Financial Control, Financial University under the Government of the Russian Federation. Currently engaged in teaching economic and managerial disciplines at the Faculty "Public Administration and Financial Control" and research in the field of state financial control, audit, controlling in the public sector, problems of regional development and economic education. Research interests: sustainable development of regions, state audit, control, internal control systems, training in economics and financial mathematics, controlling.

ORCID ID: <https://orcid.org/0000-0001-6075-1488>

Maria V. MIKHAILOVA

Senior Lecturer, Department of Orthopedic Dentistry, I.M. Sechenov First Moscow State Medical University, Russian Federation, 119991, Moscow, Trubetskaya st., 8-2, is currently teaching clinical dentistry for undergraduate and graduate students and researching to develop a new concept for the treatment and rehabilitation of patients with concomitant pathology using modern digital technologies in orthopedic dentistry. She is a participant in the project 5-top 100 of the I.M. Sechenov First Moscow State Medical University, Russian Federation, the only one among the medical universities of the country, was included in the project to increase the competitiveness of leading Russian universities among the world's leading scientific and educational centers.

ORCID ID: <http://orcid.org/0000-0001-9267-1319>

Igor B. VAKHRUSHEV

Associate Professor Department of Tourism, V.I. Vernadsky Crimean Federal University, Russian Federation

Research interest: Business, Management and Accounting, Marketing, Environmental Science, Tourism, Leisure and Hospitality Management, Earth and Planetary Sciences, Geography, Planning and Development

ORCID ID: <http://orcid.org/0000-0001-9702-0005>

Roman A. ALESHKO

Associate Professor Department of Information Systems and Technologies, Northern (Arctic) Federal University, Russian Federation. Research interest: Environmental Science, Remote Sensing of Environment, Geoinformation Technologies, Earth and Planetary Sciences, Computer Science, Information Technologies.

ORCID ID: <https://orcid.org/0000-0002-1235-8937>

Register for an ORCID ID:

<https://orcid.org/register>

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LABOR OPPORTUNISM AS A BLOCKING FACTOR FOR THE INNOVATIVE DEVELOPMENT OF INDUSTRIAL ENTERPRISES

Irina I. Frolova ^{1*}, Vladimir V. Nosov ², Nadezhda B. Zavyalova ³, Aleksei E. Dorofeev ⁴,
Tatiana M. Vorozheykina ⁵, Lyudmila I. Petrova ⁶

¹ Kazan Innovative University named after V.G. Timiryasov, Moskovskaya st., 42, Kazan, Russian Federation

² K.G. Razumovsky Moscow State University of technologies and management (the First Cossack University) (RAZUMOVSKY MSUTM (FCU)), 109004, st. Ground Val, 73, Moscow, Russian Federation
Academy of the Investigative Committee of the Russian Federation, Moscow, Russian Federation

³ Plekhanov Russian University of Economics, Stremyanny lane, 36, Moscow, 117997, Russian Federation

⁴ I.M. Sechenov First Moscow State Medical University of the Ministry of Health of the Russia, Trubetskaya st., 8/2, Moscow, Russian Federation

⁵ Financial University under the Government of the Russian Federation, Leningradsky Prospekt, 49, 125993, Moscow, Russian Federation

⁶ Altai state University, Lenina Str. 61, Barnaul, Russian Federation

E-mail: *¹ fii@mail.ru (Corresponding author)

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Abstract. The innovative way of enterprise development depends on many issues in the framework of legislation, financing, infrastructure, human resources, technological base, information, and other areas. The current study analyzes the factors that determine the manifestations of labor opportunism and its forms based on functional and resource approaches, taking into account institutional and economic constraints among workers in the energy industry. The results of a sociological study on the forms of opportunistic behavior at the enterprises of the energy industry are presented. The results of the study indicate that labor opportunism is one of the significant factors that block the innovative development of an enterprise. It has a major impact on labor relations as long as one of the conditions for the emergence of opportunism is a conflict of interests between the employee and the employer. It occurs when the interests of one economic agent run counter to the interests of another. This is proved by the results of assessing the influence of various factors on the opportunism level of employees of energy enterprises and is based on correlation and regression analysis. In the framework of this study, labor opportunism is understood as a form of selfish behavior of an employee pursuing personal gain as a response to a conflict of interests between economic agents in the course of labor activity. The conclusions reached suggest that labor opportunism should be considered as a blocking factor when designing the innovative development of an industrial enterprise. Measures aimed at overcoming labor opportunism, building trust in the team and raising the level of innovation in enterprises are proposed.

Keywords: labor opportunism; innovative development; innovative activity; opportunistic behavior

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1. Introduction

The relevance of studying labor opportunism is determined by its significance as an economic phenomenon characteristic of any economic system which contains labor relations.

The study of labor opportunism as a negative phenomenon that impedes the innovative development of enterprises is becoming an urgent issue in management practice. Many scientists (Belyaev et al., 2013; Bodrov et al., 2014; Ruff, 2014, 2018; Krasikov and Roshchina, 2018; Adams, 2019; Lane, 2017, Rutten and Oerlemans, 2009; Bernardi, 2019) pay attention to various factors determining the manifestations of labor opportunism and its forms based on functional and resource approaches. The institutional and economic constraints of workers are also taken into account.

Labor opportunism has a serious impact on labor relations since one of the conditions for its emergence is a conflict of interests between the employee and the employer, when the interests of one economic agent run counter to the interests of another. The results of assessing the degree of influence of various factors on the level of labor opportunism of energy enterprises' employees based on correlation and regression analysis show that labor activity is often opportunistic in nature. It blocks the innovative development of enterprises and the exercising of the initiative (Bekebayeva et al., 2019; Strunc, 2019; Shatalova et al., 2015; Lateef et al., 2019; Zeibote et al., 2019; Voronkova et al., 2019; Yemelyanov et al., 2018; Magsumov, 2014, 2017; Anamova and Nartova, 2019).

A pilot case study was conducted by a questionnaire survey in order to determine the level of labor opportunism of employees of industrial enterprises in the energy sector. Five hundred employees aged 18 to 65 years old took part in it, out of which 26.2% were from 18 to 29 years old; 20.4% were 30-39 years old; 28.8% were 40-49 years old; 18.4% were 50-59 years old, and 6.2% were over 60 years old. Most of the respondents were men (62.8%). Additionally, 20 managers of different levels were interviewed. More than half of the managers (65%) were in the age group over 50 years old, 35% of managers aged 40 to 49 years.

Object of study: factors that determine the manifestations of labor opportunism and its forms based on functional and resource approaches, taking into account institutional and economic constraints among workers in the energy industry.

The subject of the study is labor opportunism as a factor in blocking the innovative development of enterprises in the energy sector.

Objectives of the study:

1. Conduct a review of scientific research on the issue of labor opportunism.
2. Study the factors that determine the manifestations of labor opportunism and its forms in the energy industry.
3. Analyze and interpret the results of sociological study in order to determine the level of labor opportunism in the energy sector enterprises.
4. Determine the influence of various factors on the level of labor opportunism of employees of energy enterprises based on correlation and regression analysis.
5. Provide conclusions and develop recommendations aimed at leveling the factors of labor opportunism of workers that block the innovative development of enterprises.

The following hypotheses are made:

- labor opportunism is present in any enterprise as a response to the opposition of economic interests of the employee and the employer;

- various factors that affect the labor opportunism of workers and block the innovative development are identified in the practice of enterprise management;
- workers and managers have a different view of labor opportunism;
- labor opportunism has a serious impact on the innovative efficiency of the enterprise.

According to the study results, 72.4% of respondents among employees and 85% of managers noted that employees exhibited opportunistic behavior in the process of working while pursuing their own benefits.

All managers participating in a sociological survey considered labor opportunism a serious threat to the development of the enterprise and to its effective functioning.

The results obtained are of practical importance not only for enterprises of the energy sector but for all industrial enterprises where it is possible to use a scientific-integrative model of anti-opportunistic behavior using managerial mechanisms in the system of social and labor relations of the enterprise, using the model equation obtained by the ordinary least squares (OLS) method.

2. Literature review

Innovative efficiency is considered in scientific studies (Arvanitis et al., 2008; Bae and Chang 2012; Lazzarotti et al. 2012; Meissner and Carayannis 2017; Tvaronavičienė, 2017; Hou et al. 2019; Omarova et al., 2018; Radicic et al. 2019; Akhmetshin, 2017; Pavlyshyn et al., 2019; Tarman and Dev, 2018; Saenko et al., 2019; Prodani et al., 2019; El Iysaouy et al., 2019) as a competitive advantage of enterprises that can support their sustainable development. It depends on many factors of both external (legislation, external knowledge, etc.) and internal environment of the company (personnel, information, equipment, etc.).

The key factor influencing the innovative development of the enterprise is the personnel, particularly their knowledge, loyalty to the company and innovative behavior without labor opportunism. A destructive change in work behavior can lead to devastating changes in other economic activities (Arman et al. 2019).

Opportunistic behavior is widespread in various fields like politics, economics, public life, and others. Special attention in the literature has recently been given to the behavior of employees in the course of the working process. Some Russian authors (Bodrov 2008, 2014; Belyaev et al. 2013, 2015, 2017; Ishchenko and Magsumov, 2019; Prokhorova et al., 2016; Dmitrieva et al., 2017; Trofimova et al., 2019; Girenko 2012; Pyatkova 2016) update the problems of research on labor opportunism and forms of its exhibition. Labor relations on a contractual basis imply the emergence of opportunistic behavior on the part of both the employer and the employee. Such kind of behavior causes a decrease in the level of labor productivity in the enterprise (Korableva et al., 2019; Sycheva et al., 2018; Luzina et al., 2019; Prodanova et al., 2019a,b; Ziyadin and Gulmira, 2015; Shrestha, 2019; Tadeu et al., 2019). It also blocks the innovative development of companies and increases transaction costs.

The main forms of opportunistic behavior in industrial enterprises are the opportunism of the employer and the opportunism of the employee.

This problem is covered in studies of foreign authors. The results of a number of studies (Laan et al. 2011; Wang et al. 2011; Belloc, 2012; Marjanovic et al. 2012; Bigliardi and Galati, 2016; Basterretxea et al., 2019; Guerrero et al. 2019; Rizki et al., 2019) show that labor opportunism affects the innovative development of enterprises. For example, scientists analyze the principle of cooperation in introducing innovations “through cooperation and overcoming the risk of opportunistic behavior” (Basterretxea et al., 2019) or its weakening due to the project unification (Laan et al., 2011). Jan-Erik Lane reviews opportunism as fraudulent behavior at the micro-level as one of its forms. Some scientists (Williamson, 1993; Rutten and Oerlemans, 2009) conducted a study of opportunistic behavior through the prism of trust meaning that labor opportunism is absent where the company has a high level of trust in the team.

The most interesting is the view of Bengt-Ke Lundvall (2016). The author draws attention to the fact that opportunistic behavior leads to increased costs when introducing complex product innovations.

Labor opportunism should be understood as a form of selfish behavior of an employee pursuing personal gain as a response to a conflict of interests between economic agents in the course of labor activity.

3. Methods

Labor opportunism was identified among the significant factors blocking the innovative development of the enterprise.

The study of the energy industry enterprises of the Republic of Tatarstan included the following:

1. A questionnaire survey determining the level of labor opportunism in industrial enterprises of the energy sector. Respondents had to answer 20 questions in the questionnaire, which allowed determining the presence of various factors affecting labor opportunism of workers and blocking the innovative development of the enterprise. Employees and managers answered the same questions.

The questionnaire survey was conducted at four energy enterprises of the Republic of Tatarstan with more than 100 employees. Anonymous data collection was carried out from respondents who were ready to answer the questions presented in the questionnaire.

The survey of managers covered all levels of management (20% – top management, 35% – middle management and 45% – lower management).

The collection and analysis of personal data based on the methods of grouping, classification, ranking and comparative analysis made it possible to systematize information and highlight the factors that determine the manifestations of labor opportunism and its forms, including those that block the innovative development of enterprises.

The data obtained is considered representative.

2. Assessment of the degree of influence of various factors on the level of labor opportunism of employees of energy enterprises based on correlation and regression analysis using the Gretl statistical package:

- at the first stage, a selection of factors most closely related to the effective attribute was carried out based on a matrix of paired correlation coefficients;

- at the next stage, the least-squares method was used to construct two models of the level of opportunism dependence on various factors. The first one is based on workers' (n = 500) opinion and the second one is according to the managers' (n = 20) perspective. The level of workers' opportunism (y) was considered to be a dependent variable;

- at the third stage, an analysis of the constructed models of the level of labor opportunism dependence on various factors was carried out and conclusions were made.

4. Data Collection

A secondary analysis of research data on opportunism and labor behavior that affects the innovative development of enterprises, the results of proprietary pilot sociological research and the results of a correlation-regression analysis of the degree of influence of various factors on the level of labor opportunism of energy enterprises employees formed the empirical basis of the study.

A sample selection of a pilot sociological survey conducted by the questionnaire survey method consisted of 500 people at the age of 18 to 65 years, out of which 26.2% were from 18 to 29 years old; 20.4% were 30-39 years; 28.8% were 40-49 years old; 18.4% were 50-59 years old, and 6.2% were over 60 years old. Most of the respondents were men (62.8%). In addition, 20 managers of different levels of government were interviewed.

More than half of the managers (65%) were in the age group of over 50 years old, 35% of managers aged 40 to 49 years.

The results of employees' sociological study revealed factors that affected labor opportunism of workers and blocked the innovative development of the enterprise or (see Table 1).

Table 1. The presence of factors affecting labor opportunism of workers and blocking the innovative development of the enterprise (%)

No.	The presence of the factor in the organization	According to employees (n = 500)	According to managers (n = 20)
1.	The company requires working on weekends and holidays	12.2%	10%
2.	The management often asks to stay late after work	12.2%	15%
3.	Functional performance not included in official duties is observed	29.8%	40%
4.	The staff is more often not satisfied with their work	31%	30%
5.	The staff is more often not satisfied with the moral and psychological climate in the team	35%	35%
6.	Dissatisfaction with wages	72%	90%
7.	Lack of correlation between the work done and the wages rate	93%	50%
8.	The wage does not match the amount of work performed	73%	20%
9.	Adverse teamwork between employees	17.4%	25%
10.	Adverse relationship between the supervisor and subordinates	38%	50%
11.	Providing management with an interest in involving staff in the development of recommendations for improving the activities of the unit and innovative ideas for the development of the enterprise	9.2%	30%
12.	Feedback on positive changes in the company	8.2%	30%
13.	Work overload	42.4%	60%
13.	The practice of double standards in the organization	79%	20%
14.	Underutilization of staff	2.6%	45%
15.	Lack of trust in the team	82%	90%

Source: The authors

Thus, according to the results of the study, 15 factors were identified that affect the opportunism of workers and block innovation in the enterprise.

The analysis of Table 1 shows that the most significant factors for the staff are the lack of correlation between the work done and the wages rate (93%), lack of trust in the team (82%) and the practice of double standards (79%).

According to managers, the most significant factors affecting employee opportunism and blocking the innovative development of an enterprise are dissatisfaction with the wages rate (90%) and lack of trust in the team (90%).

Table 2. Types and forms of opportunistic behavior

No.	Type (form)	According to employees	According to managers
1.	Employee workplace absence	–	–
2.	Heavy activity imitation	24.2%	40%
3.	Long approval of documents, projects, etc.	22.6%	50%
4.	Delaying accomplishment of work that can be done faster	57%	70%
5.	Gratuitous use of employee personal contacts to solve company problems	38.4%	25%

Source: The authors

The data in Table 2 show that the most common form of opportunistic behavior is delaying the accomplishment of work that can be done faster, indicated by 57% of employees and by 70% of managers.

According to respondents, managers have the following types of opportunism:

- requiring the employees to perform functions not included in the range of official duties – 29.8%;
- requiring to work on weekends and holidays – 12.2%.
- gratuitous use of personal connections of an employee to solve company problems – 38.4%.

5. Data Analysis

Correlation and regression analysis were performed in the framework of the current study in order to quantify the influence of the factors presented in Table 1 on the level of labor opportunism at enterprises of the energy sector. At the same time, due to the ease of interpretation, the following form of a linear model of multiple regression was chosen:

$$y = a_0 + a_1x_1 + a_2x_2 + \dots + a_{15}x_{15},$$

where y is the frequency of cases of opportunism in the organization (effective sign),

x_1, x_2, \dots, x_{15} – values of 15 factors presented in Table 1,

a_1, a_2, \dots, a_{15} – the parameters of the model equation obtained by the ordinary least squares (OLS) method.

At the first stage, factors were selected into the model on the basis of a matrix of paired correlation coefficients. Those were selected out of the x_1, x_2, \dots, x_{15} factors for which the correlation coefficient is the smallest among the other factors, and at the same time is the largest with the effective attribute y . This allowed selecting the most significant factors and eliminating multicollinearity, that is, the combined influence of factors on the result that distorts the results of the model. The following factors were selected in the model as a result of the analysis of the pair correlation coefficients matrix:

x_6 – degree of dissatisfaction with the wage rate;

x_7 – degree of correlation between the work done and the wage rate;

x_{15} – degree of lack of trust in the team.

At the next stage, the following model was obtained (see Table 3) using the least-squares method. Five hundred observations were used ($n = 500$), the level of opportunism of workers (y) was viewed as a dependent variable.

Table 3. Model 1: Dependence of the level of opportunism on x_6 , x_7 , x_{15} factors (according to employees)

	Coefficient	Std. error	t-statistics	P-value
x_6	0.432815	0.0826546	4.5863	0.00002
x_7	0.534671	0.0654372	4.2451	0.00001
x_{15}	0.456781	0.0789047	2.3710	0.00082

Average variable dependency	0.435467	Statistical deviation of variable dependency	03565746
Sum of squared errors	3.854373	Statistical model error	0.185465
R-squared	0.865457	Corrected R-squared	0.835436
F(3, 497)	2.734647	P-value	2.12e-39
Logical credibility	22.43543	Akaike criterion	-36.36657
Schwartz criterion	-27.5434	Hannan-Quinn criterion	-32.63654

The analysis of the model quality shows that it is high-quality and reliable since the value of the R-square = 0.865 exceeds the threshold value of 0.5 significantly. This means that the constructed regression model accounts for 86.5% of changes in the level of opportunism, and the remaining 13.5% is explained by the influence of other factors that are not included in the model.

The value of the P-value parameter turned out to be 2.12e-39, which is significantly less than the threshold value of 0.05. This means that the model is generally significant.

The “Standard error” parameter estimates sample standard deviations for each coefficient of the regression equation and standard error of the coefficients. In this model, the P-value of all regression coefficients was less than 0.05, so those can be considered statistically significant. For the constructed model, the standard error is much lower than the regression coefficient (R-squared = 0.865), which suggests that the model is also reliable according to this criterion.

In order to assess the impact of each identified factor on the level of labor opportunism of employees in the company, elasticity factors for each of them were calculated. As a result, it was revealed that with an increase in wages by 1%, the level of labor opportunism of employees will decrease by 0.42%. In case the increase in the number of workers who see the connection between the work done and the wages is 1%, the labor opportunism level will decrease by 0.35%. With an increase in the level of trust in the team by 1%, the level of opportunism will decrease by 0.31%.

As a result of the analysis, the regression equation of labor opportunism of employees was constructed based on the obtained regression coefficients, from the point of view of the workers themselves:

$$y = 0.432x_6 + 0.534x_7 + 0.456x_{15}.$$

If the average values of the corresponding variables are placed in this regression equation, then an average quantitative estimate of the level of labor opportunism of employees is obtained:

$$y = 0.432 \cdot 0.39 + 0.534 \cdot 0.42 + 0.456 \cdot 0.32 = 0.483.$$

That means that from the point of view of the workers themselves, 48.3% of their work is opportunistic in nature, which blocks the innovative development of enterprises and the exhibition of the initiative.

A similar regression model of opportunism of workers was built on the basis of a survey of managers. Moreover, the following 4 significant factors were selected based on the matrix of pair correlation coefficients:

x_6 – the degree of dissatisfaction with the wage rate;

x_{10} – the level of relationship between the leader and his subordinates;

x_{13} – the level of work overload;

x_{15} – the degree of lack of trust in the team.

The results of the second simulation are presented in Table 4. Twenty observations were used ($n = 20$). The level of opportunism of workers (y) was viewed as a dependent variable.

Table 4. Model 2: Dependence of opportunism on $x_6, x_{10}, x_{13}, x_{15}$ factors (according to managers)

	Coefficient	Std. error	t-statistics	P-value
x_6	0.4984013	0.110475	4.4670	0.00035
x_{10}	0.3829410	0.039484	3.7401	0.00012
x_{13}	0.3294871	0.119349	2.5866	0.03739
x_{15}	0.4304724	0.135284	3.3848	0.00248

Average variable dependency	0.543375	Statistical deviation of variable dependency	0.036747
Sum of squared errors	0.054636	Statistical model error	0.064636
R-squared	0.954644	Corrected R-squared	0.935476
F(3, 497)	129.4245	P-value	1.18e-12
Logical credibility	22.47654	Akaike criterion	-41.05437
Schwartz criterion	-33.3747	Hannan-Quinn criterion	-37.26453

An analysis of the model 2 quality showed that its reliability was 0.9546, since the value of R-squared = 0.955. That means that this regression model describes 95.5% of the changes in the level of opportunism and only 4.5% falls under the influence of other reasons not included in the model.

The P-value parameter equal to 1.18e-12 turned out to be less than 5%, which confirms the significance of the model as a whole.

The value of the Standard Error parameter turned out to be 0.06, which is lower than the regression coefficient (R-squared = 0.955); therefore, according to this criterion, the model is reliable.

The values of the elasticity coefficients according to this model indicate that with an increase in wages by 1%, the level of labor opportunism of workers will decrease by 0.57%. Further, with an increase in the level of relations between the manager and subordinates by 1%, the opportunism level will decrease by 0.32% and with a decrease in the level of workload, it will decrease by 0.25%. If the level of trust in the team is increased by 1%, the opportunism level decreases by 0.43%.

Based on the regression coefficients obtained as a result of the analysis, the regression equation of labor opportunism of workers was constructed from the managers' point of view:

$$y = 0.498x_6 + 0.383x_{10} + 0.329x_{13} + 0.43x_{15}.$$

By substituting the average values of the corresponding variables in this equation, the average quantitative assessment of the level of labor opportunism of employees of energy enterprises was calculated:

$$y = 0.498 \cdot 0.34 + 0.383 \cdot 0.32 + 0.329 \cdot 0.41 + 0.43 \cdot 0.32 = 0.564.$$

This means that, according to managers, 56.4% of the activities of employees of the energy sector industrial enterprises are opportunistic in nature. Its effect is the lack of initiative on the part of the staff to improve the company and its innovative development.

6. Discussion

Innovation can become a restrictive barrier to a destructive economy if an economic entity "can strengthen its comparative advantage based on innovation" (Arman et al., 2019, p. 75). At the same time, researchers note that "innovation and social change have a devastating effect on the world system" (Arman et al., 2019, p. 76). Accordingly, in response to changes and the inability to adapt to them, the opportunistic behavior of personnel may arise in the form of resistance to the introduction of innovations, suppression of ideas, etc.

The conducted analysis made it possible to identify the current level of labor opportunism of workers in the energy sector, which affects the innovative development of the enterprise. On average, it is 48.3% as estimated by the employees themselves and 56.4% as estimated by managers.

In the process of researching forms of opportunistic behavior within the energy sector enterprises, it was revealed that the most common form of it was to drag out time to complete work that could be done faster: 57% of employees and 70% of managers.

Among respondents, 40% of managers and 24.2% of employees believe that the company often imitates heavy activity.

In general, according to the results of the study, various factors affecting labor opportunism of workers are observed at enterprises in the energy sector.

The opinions of staff and managers differ significantly on the following factors that affect labor opportunism of workers and block the innovative development of the enterprise: lack of correlation between the work done and the wages: 93% of employees versus 50% of managers; wages do not correspond to the volume of work performed – 73% versus 20%. Most of the employees surveyed (82%) noted the organization's practice of double standards and only 20% of managers indicated this. The management team of the company (45%) believes that employees are not overloaded with work, while employees themselves almost do not think so (2.6%).

It should be noted that in the opinion of only 9.2% of employees, the management is interested in involving staff in the development of recommendations for improving the activities of the unit and innovative ideas for the development of the enterprise. Among the managers' answers, the value of this indicator is 3.26 times higher.

Despite the differences in assessments of various factors of opportunism, both workers and managers agree that there are two factors significantly affecting the level of labor opportunism and blocking the innovative development of enterprises: dissatisfaction with the wage rates and lack of trust in the team (Konovalov et al., 2017; Sharafutdinov et al., 2017).

Williamson (1993) in his economic theory of transaction costs regarded trust as the absence of opportunistic behavior (Williamson, 1993).

A 1% reduction in dissatisfaction with wages will lower the level of opportunism of workers by an average of 0.42% according to the workers themselves and by 0.56% according to the managers. An increase in the level of trust in the team by 1% can reduce the level of opportunism by an average of 0.57% according to workers and by 0.43% according to managers. Therefore, it is recommended that priority be given to these two factors.

Thus, there is ambiguity and differences in the responses of respondents from the group of employees and the group of managers regarding some factors that affect labor opportunism and block the innovative development of enterprises.

Conclusions

The following conclusions can be drawn based on the results of the study. Those can become the basis for a program to minimize the influence of factors that determine labor opportunism and block innovative development of an enterprise:

- labor opportunism is a factor of blocking the innovative development of enterprises;
- it is impossible to completely eliminate opportunistic behavior in the process of labor activity due to the objective opposition of the economic interests of the employee and the employer.

According to the results of a sociological study of workers in energy enterprises in the Republic of Tatarstan, the hypotheses were confirmed that labor opportunism is present in any enterprise due to the different economic interests of the employee and the employer. The most significant factors that affect the level of labor opportunism and block innovative development of the enterprise were identified.

The hypothesis of various ideas on labor opportunism among workers and managers of energy industry enterprises has also found confirmation.

The hypothesis of the influence of the identified factors on the labor opportunism level and the innovative development of enterprises was confirmed by the results of correlation and regression analysis. It was based on calculations of the corresponding elasticity coefficients using the Gretl statistical package.

The managers are offered the following recommendations in order to level the factors of labor opportunism of workers that block the innovative development of the enterprise:

1. Review the content of job descriptions for their compliance with the actual work performed.
2. Develop objective criteria for assessing the quality of labor in the context of each position.
3. Revise the organizational system of communications in order to ensure that the staff receives access to the necessary information for quality work.
4. Establish regular feedback from staff, broadcast positive changes to the team and the corresponding role of employees.
5. Arrange a study of the working time. Determine the standards for the performance of a particular operation.
6. Develop recommendations on the involvement of personnel in the processes of continuous improvement of the company.

7. Develop an action plan for team building and the formation of trusting relationships that contribute to the exhibition of the initiative on the part of the staff.
8. Constantly train employees in problem areas of knowledge.
9. Review communication channels for transparency of information.
10. Organize the collection of ideas and opinions from employees: how to improve their work to improve the efficiency of the company and its innovative development.

Prospective research can be aimed at developing a model for the formation of anti-opportunistic behavior that impedes blocking the enterprise innovative development due to the human factor.

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Irina FROLOVA is the PhD (Sociology), Associate Professor, Deputy Director on scientific work Kazan Innovative University named after V.G. Timiryasov, Kazan, Russia. Research interests: entrepreneurship and regional development; innovation and small firms; small firm internationalization; sustainability.

ORCID ID: <https://orcid.org/0000-0002-8707-6336>

Vladimir NOSOV

Doctor of Economics, Associate Professor. K.G. Razumovsky Moscow State University of technologies and management, Moscow, Russia, Moscow. Academy of the Investigative Committee of the Russian Federation, Moscow, Russia

Research interests: risk management in the sectors of the national economy.

ORCID ID: <https://orcid.org/0000-0001-6158-0924>

Nadezhda ZAVYALOVA

Ph. D, associate professor of Entrepreneurship and logistics department of Plekhanov Russian University of Economics. Expert in applied business research and analysis; leading supervisor for students' scientific projects. Currently engaged in teaching methods and methodologies of research, project management, corporate IT systems.

Research interests: project management, digitalization of business processes, big data analysis.

ORCID ID: <https://orcid.org/0000-0003-2939-4974>

Aleksei DOROFEEV

Senior Lecturer, 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, corporate ethics

ORCID ID: <https://orcid.org/0000-0002-0815-4472>

Tatiana VOROZHEYKINA

Doctor of Economics, Professor of Accounting, Account Analysis and Audit Department, Financial University under the Government of the Russian Federation

Specialist in internal corporate control, improvement of business processes and practices

Research interests: internal corporate control, digital economy and technological innovations, labor economy

ORCID ID: <https://orcid.org/0000-0001-7295-1372>

Lyudmila PETROVA

PhD in Economics, associate Professor of the Department of management, business organization and innovation of the Altai state University. Research interests: processing industry, sustainable development of territories, innovative, technological and social entrepreneurship, organic production, human capital.

ORCID ID: <https://orcid.org/0000-0002-5339-9567>

Register for an ORCID ID:

<https://orcid.org/register>

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ASSESSMENT OF THE FINANCIAL SECURITY OF INSURANCE COMPANIES IN THE ORGANIZATION OF INTERNAL CONTROL

Aksana A. Turgaeva¹, Liudmila V. Kashirskaya^{*2}, Yulia A. Zurnadzhlyants³,
Olga A. Latysheva⁴, Irina V. Pustokhina⁵, Andrei V. Sevbitov⁶

¹Astrakhan State technical university, 16, Tatischeva st., 414025, Astrakhan, Russian Federation

²Financial University under the Government of the Russian Federation, Leningradsky Prospekt, 49, 125993, Moscow, Russian Federation

³Astrakhan State Medical University, Bakinskaya Street, 121, 414000, Astrakhan, Russian Federation

⁴Altai State University, Lenin Ave., 61, 656049, Barnaul, Russian Federation

⁵Plekhanov Russian University of Economics, Stremyanny lane, 36, 117997, Moscow, Russian Federation

⁶Sechenov First Moscow State Medical University, 119991, Moscow, Trubetskaya st., 8-2, Russian Federation

E-mails: ^{*2}kashirskaya76@mail.ru (Corresponding author)

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Abstract. The article is devoted to assessing the financial security of the activities of insurance companies as one of the stages in the implementation of all types of economic control and, in particular, internal control. The internal control of the business process connected with the assessment of financial security, with the assessment of risks in insurance companies at the present stage of economic development, is an urgent issue in the era of financial crises. Moreover, this area of internal control is not fully developed for practical use in insurance. The article provides an algorithm for assessing the financial security of an insurance company in internal control, and proposes a phased monitoring of the assessment of financial risks of an insurance company. Under the methodology of the study the following methods were taken: the methods of determinative factor analysis, an indicative method for determining the criteria for evaluating indicators. It is concluded that the need has arisen for using, as one of the sections of the methodology, the internal control of assessing the financial security of an insurance company. The result of the study was the development of an algorithm for conducting one of the sections of internal control using an assessment of the financial security of an insurance company. The practical significance of the article lies in the fact that conclusions and suggestions are aimed at developing modern economic control and contribute to real business optimization. A study conducted by the authors revealed that the new reality has changed the attitude towards the use of standard methods that do not take into account the particular functioning of companies, and requires the modernization of old ones and the introduction of new approaches to economic control methods.

Keywords: economic control; internal control; insurance company; financial security; risks; assessment

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1. Introduction

The insurance sector of the economy at the new stage of its development is undergoing transformations associated with the application of economic control in its accounting and analytical activities. To a greater extent this is due to the transfer of insurance organizations to the category of public joint-stock companies. The activities of such business entities are regulated by the federal law of the Russian Federation (Federal Law of December 26, 1995 No. 208-FL). Public insurance organizations should disclose information in a wide format. To a greater extent, it benefits organizations themselves to increase the publicity of investment processes (Zhanbolatova et al., 2018; Vlasova et al., 2019; Akhmetshin, 2017). Since the public disclosure of information relates to the annual report of insurance organizations, annual financial statements, the organization of internal control is considered as an appropriate, complete and necessary process in the activities of an economic entity. With the introduction in 07/23/2013 of new article 28.1. "Internal control" in the Federal Law "About the organization of insurance in the Russian Federation", as well as article 19 of the Federal Law "About accounting" (About accounting. Article 19. Federal Law No. 402-FL, No. 50. - Art. 7344), conducting internal control in insurance companies becomes obligatory in its activities (Article 28.1. Federal Law No. 4015 -1 FL). According to information from the Ministry of Finance of the Russian Federation dated 12/26/2013 (Ministry of Finance of the Russian Federation, 2019), internal control must be applied at all levels of the economic entity and in all its divisions.

The organization of internal control in insurance companies should provide complete, reliable and objective information about financial statements, about assets and risks. Internal control should help counteract money laundering, lead to effective management of financial and economic activities, assets, risks, as well as ensure break-even and effective insurance operations (Salimova, 2016; Bench, 2016; Solonina et al., 2014; Chudaykina and Zhelikhovsky, 2019; Plaskova et al., 2019). Thus, internal control is a process that provides the economic entity with confidence in the safety of assets, achievement of high financial and operational indicators, accuracy in financial statements and its reliability, and it should also be aimed at achieving the goals of the company (Ministry of Finance of the Russian Federation, 2019). This definition can be taken as the basis for the goals of internal control of insurance companies. To achieve these goals, it is necessary to solve a number of problems associated with the specific activities of insurance companies (Goloshchapova et al., 2018; Da Costa, 2018; Sokolov et al., 2019). Therefore, the features of this field of activity require a special approach to organizing and conducting a modern, scientifically-based research process in the methodology of economic control, taking into account all the above aspects (Korableva et al., 2018).

2. Methods

The main objective of the activity of insurance companies is determined by the protection of the property rights of entities that have concluded an insurance contract in the event of an insurable event. The authors have repeatedly mentioned the risks of insurance companies in various works (Kuzovleva, 2015; Shatalova et al., 2016; Rahman, 2017; Turgaeva, 2015; 2017). The insurance business is directly related to the risks of policyholders, but the specificity of the insurance business is that as a commercial organization, insurance companies themselves take risks. These risks are associated with financial losses (for example, related to financial crises), inefficient investment (changes in the interest rate on securities), a high probability of losses, for example, due to fluctuations in the value of assets, and cumulative accumulation. The interpretation of the concept of financial security has been considered by many authors (Sushkova, 2019; But 2018; Vasilev, 2016; Eremeychuk and Mashyanova, 2016; Lobanov, 2018, 2019; Kozmenko and Ruban, 2014; Saenko et al., 2019; Prodanova et al., 2017; Bovsunovska, 2017; Trofimova et al., 2019; Yemelyanov et al., 2018; Bisultanova et al., 2018; Popova et al., 2017; Boboshko, 2017; Michailova et al., 2017; Masood et al., 2019; Vigliarolo, 2020; Chehabeddine, Tvaronavičienė, 2020)

Risks of insurance companies can be considered in various areas of activity, but since the scientific literature still does not address the issue of an internal control algorithm for assessing the financial security of an insurance

company, we consider it appropriate to develop such an algorithm that will allow any insurance company to properly evaluate its own financial security.

3. Results

An assessment of the financial security of the activities of insurance companies as one of the stages in the implementation of all types of economic control, and, in particular, internal control, should include the following steps and consist of seventeen sequential actions aimed at a comprehensive analysis of indicators and threats to financial security (Fig. 1).

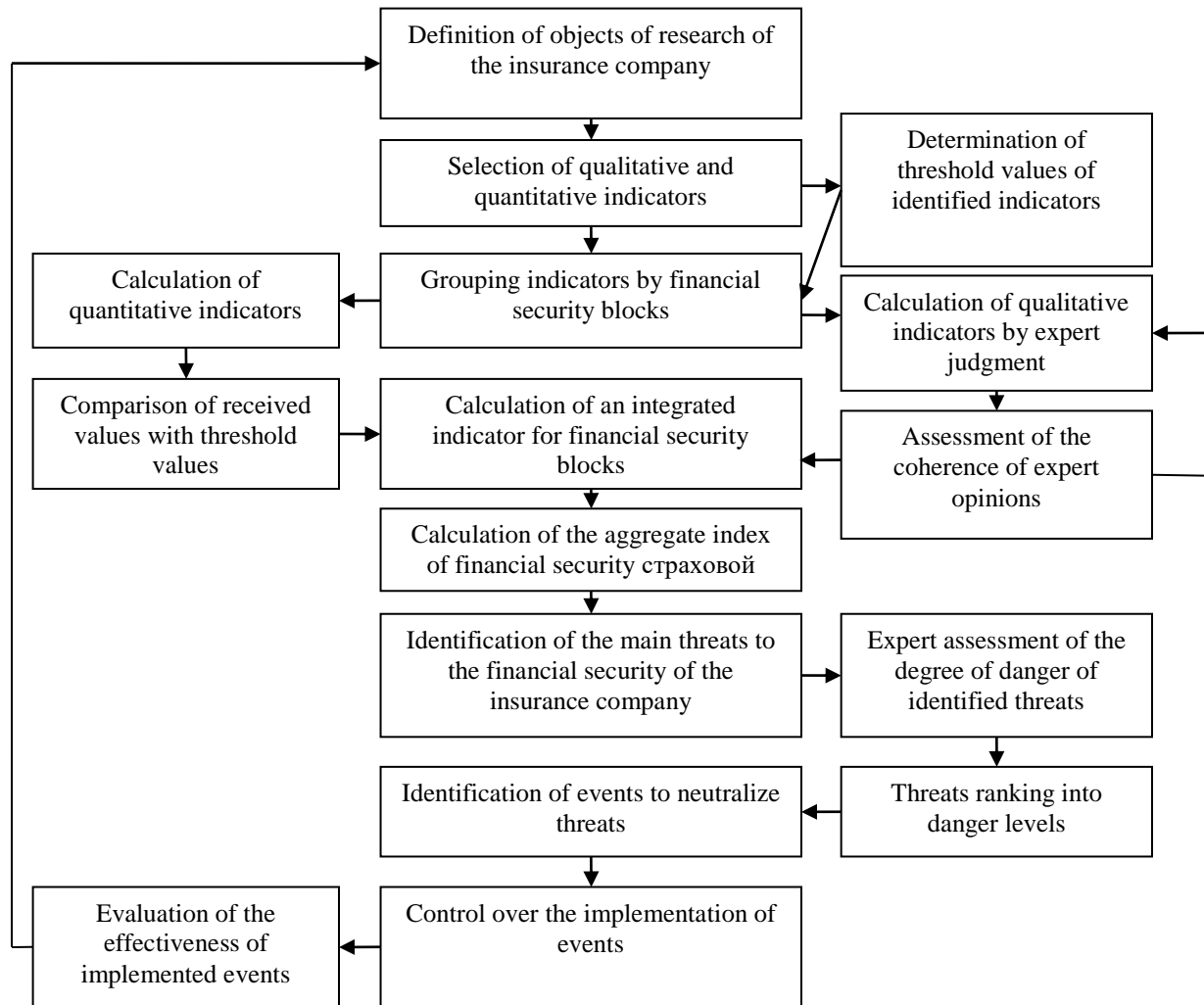


Fig. 1. The internal control algorithm for assessing the financial security of an insurance company

Source: own research

1st stage. It consists in determining the objects under study of the financial security of the insurance company. In other words, this is the collection and systematization of the necessary company information, such as financial statements, a report on financial results, annual reports of departments of the insurance company, etc., the data of which will be used to calculate indicators.

2nd stage. It consists in the selection of qualitative and quantitative indicators for assessing the financial security of an insurance company. Most quantitative indicators are widely used to assess the financial security of an organization (enterprise) of any economic field. However, it is worthwhile to include in the regulation of the internal control process a list of quantitative indicators and those that will allow you to assess the financial condition of the characteristics of the financial activities of the organization. As for the qualitative indicators, these indicators will help determine the frequency of payments, insurance premiums, as well as costs of litigation. They are also aimed at identifying fraudulent agreements in the company's activities, determining the impact of risks on insurance activities in general. Table 1 shows the main quantitative and qualitative indicators for assessing the financial security of an insurance company.

Table 1. Qualitative and quantitative indicators for assessing the financial security of an insurance company

№ s/i	Quantitative indicators	Threshold value	Qualitative indicators	Threshold value
1	Current liquidity ratio	1,5-2	Qualitative dynamics of the company's insurance reserves	Increment
2	Absolute liquidity ratio	0,2-0,3	The frequency of insurance payments of the company under insurance contracts	Moderately
3	Financial independence ratio	>0,5	Frequency of expenses of litigation cases (including those by type of insurance)	Rarely
4	Capital adequacy ratio	>0,1	Company integrity assessment of insurance premium payments	Fixed payments
5	Financial stability ratio	>0,7	The degree of influence of risks on the activities of the insurance company	Minimally exposed
6	Leverage ratio	<1	Frequency of conclusion of insurance contracts per month	Often
7	Receivable turnover ratio	>15	Level of attracted insurance clients (including those by type of insurance)	High
8	Profitability of assets	>0,10	Percentage of fraudulent contracts concluded per year	Minimal
9	Profitability of equity	>0,15	Rating assigned by rating agencies	Top-10
10	Profitability of insurance operations	>0,12		
11	The level of insurance payments by type of insurance	>0,6		
12	Percentage of reinsurers in insurance reserves	0,05-0,3		
13	The ratio of change in the volume of insurance premiums (including those by type of insurance)	1,0-1,1		
14	Moving loss ratio	>0,65		

Source: own research

As can be seen from table 1 above, for a comprehensive assessment of financial security, multidirectional indicators are proposed, with the help of which it is possible to assess the financial security of any insurance company. However, it is worth noting that this list of indicators is not exhaustive.

3rd stage. Defining threshold values for selected indicators of assessing the financial security of the insurance company. In most cases, the threshold values of these quantitative indicators are scientifically fixed. As for the specific quantitative and qualitative insurance indicators of the company, in this case, table 1 shows the estimated threshold values for insurance companies. However, as noted above, insurance companies themselves have the right to set their own threshold values based on the specifics of their insurance activities.

4th stage. Grouping of selected indicators by blocks of financial security indicators. Since a wide range of financial security indicators is proposed, it is suggested to distribute the above indicators into blocks for ease of calculation. We propose to separate quantitative indicators (Table 2).

Table 2. Grouping indicators by financial security blocks

№ s/i	The title of the indicators	The title of the block
1	Current liquidity ratio	Indicators of insurance company liquidity ratios
2	Absolute liquidity ratio	
3	Financial independence ratio	Indicators of financial stability of the insurance company
4	Capital adequacy ratio	
5	Financial stability ratio	
6	Leverage ratio	
7	Moving loss ratio	Indicators of insurance company profitability ratios
8	Profitability of assets	
9	Profitability of equity	
10	Profitability of insurance operations	Indicators of insurance company payments
11	The level of insurance payments by type of insurance	
12	The ratio of change in the volume of insurance premiums (including those by type of insurance)	
13	The frequency of insurance payments of the company under insurance contracts	
14	Receivable turnover ratio	Rating indicators of insurers of an insurance company
15	Company integrity assessment of insurance premium payments	
16	Level of attracted insurance clients (including those by type of insurance)	
17	Frequency of conclusion of insurance contracts per month including those by type of insurance)	Rating indicators of insurers of an insurance company
18	Percentage of fraudulent contracts concluded per year	
19	Percentage of reinsurers in insurance reserves	Indicators of insurance reserve ratios
20	Qualitative dynamics of the company's insurance reserves	
21	Frequency of expenses of litigation cases (including those by type of insurance)	Insurance company expense indicators
22	The degree of influence of risks on the activities of the insurance company	Insurance company risk indicators
23	Rating assigned by rating agencies	Other indicators

Source: own research

It is also worth noting that this stage of diagnostics of the financial security of the insurance company will allow to evaluate the financial security of a particular block of indicators.

5th stage. Calculation of quantitative indicators of the financial security of an insurance company. Comparison of actual data with threshold values. At this stage of assessing the financial security of the insurance company, quantitative indicators are calculated both for the studied financial year and for previous periods to further compare the dynamics of the financial security of the insurance company.

6th stage. Correlation of actual indicators with threshold values. This stage is necessary for further calculation of the integrated indicators of financial security. The ratio of financial security indicators of the insurance company with their threshold values is determined as follows according to formula 1:

$$Pfb_i = K_{iact} / K_{inorm} \quad (1)$$

where Pfb_i – the value of the i-th indicator of financial security of the insurance company;

K_{iact} – the actual value of the i-th indicator of financial security of the insurance company;

K_{inorm} – threshold value of the i-th indicator of financial security of the insurance company.

For convenience, the obtained values are entered in the table with the calculations.

7th stage. Calculation of qualitative indicators of the financial security of an insurance company through expert judgment. A group of experts evaluates qualitative indicators according to the available information about the financial activities of the insurance company. To each value of the qualitative indicator, experts give their mark in points on a 4-point scale. The scores obtained are compared with the threshold values of qualitative indicators in the same way as quantitative indicators.

8th stage. Assessment of consistency of expert opinion. Consistency of expert opinion is considered an important characteristic of the quality of the results of non-quantitative indicators.

It is recommended to calculate the consistency in terms of the Kendall concordance coefficient noted by Kuzovleva (2015, P.29). It looks as follows according to formula 2:

$$W = 12 * S / [n^2 * (m^3 - m)] \quad (2)$$

where W – coefficient of concordance of opinions of experts (by Kendall);

S – the sum of the squared deviations of all rank estimates of each examination object from the arithmetic mean;

n – the number of experts;

m – the number of examination objects.

We propose to draw up a table to calculate the assessment of expert consistency (Table 3).

Table 3. An example of the design of the table for calculating the assessment of expert consistency

№ s/i	The title of the indicator	Expert Score				Sum of ranks (clm. 3+4+5+6)	Deviation from the mean ($Q_{mean} -$ clm.7)	Deviation squared (clm.8) ²
		Expert 1	Expert 2	Expert 3	Expert 4			
1	2	3	4	5	6	7	8	9
...
n	Sum (Q_{mean})	-	-	-	-	-	-	-

Source: own research

The concordance coefficient varies in the range $0 < W < 1$, where 0 corresponds to inconsistency, and 1 corresponds to complete consistency. If the concordance value exceeds 0.40-0.50, then the quality of the assessment is considered satisfactory, if it exceeds or is equal to 0.70-0.80 - high.

If the result of assessing the consistency of expert opinions when calculating the qualitative indicators of the financial security of the insurance company exceeds satisfactory values, then it is necessary to proceed to stage 7. If the consistency score is below average, then it is recommended that experts return to step 6 to recalculate the qualitative indicators.

9th stage. Calculation of integrated indicators for blocks of financial security indicators. The integrated mark of indicators of financial security of an insurance company is determined as follows by formula 3:

$$Ifbn = \sum Pfb1 + Pfb2 + Pfb3 \dots + Pfbn / n \quad (3)$$

где $Ifbn$ – an integral mark of indicators of financial security of an insurance company;

$\sum Pfb_1 + Pfb_2 + Pfb_3 \dots + Pfb_n$ – the amount of correlated indicators of the financial security of the insurance company with their threshold values;

n – The number of indicators

For convenience, the obtained values are entered in the table with the calculations. Already at this stage of assessing the financial security of the insurance company, it is possible to identify the “problem areas” of the financial activities of the insurance company.

10th stage. Calculation of an aggregate index of financial security of an insurance company. It looks as follows according to formula 4:

$$KFB = \sum Ifb_1 + Ifb_2 + Ifb_3 \dots + Ifb_n \quad (4)$$

where KFB – aggregate index of financial security assessment of an insurance company;

$\sum Ifb_1 + Ifb_2 + Ifb_3 \dots + Ifb_n$ – the sum of the values of the integrated marks of the financial security indicators of the insurance company.

If the insurance company assessed its financial security for several periods of time, then at this stage you can study the dynamics of changes in ensuring the financial security of the insurance company and suggest the reasons for such changes.

11th stage. Determining the level of financial security of the insurance company according to the identified aggregate index. At this stage of internal control, the level of financial security is determined on the basis of a defined scale of security levels (Table 4).

Table 4. Insurance Company Financial Security Level Scale

Critical level	Low level	Average level	High level
>12	12-23	23-36	< 36

Source: own research

According to Table 4 above, the financial security of insurance companies is assessed at the following levels:

- 1) critical level (almost all indicators do not correspond to threshold values)
- 2) low level (most indicators do not correspond to threshold values);
- 3) average level (4-5 indicators do not correspond to threshold values);
- 4) high level (indicators correspond to threshold values; it is allowed that 2-3 indicators do not correspond to threshold values).

12th stage. Identification of the main threats to financial security according to a security assessment. Based on the assessment of the financial security of the insurance company, as well as the calculations of qualitative and quantitative indicators, the main threats to the financial security of the insurance company are identified. The list of these threats can also be classified according to various criteria for further convenience in determining measures to improve the financial security of the insurance company. These signs may appear (object of threat; frequency of manifestation of the threat; subject of the threat; source of occurrence, etc.).

13th stage. Expert assessment of identified threats. At this stage, it is recommended that a group of internal control auditors should conduct an assessment of identified threats using the Fine-Kinney method, which consists in assessing individual risks in any organization. This method includes the product of three components: impact, probability and consequences of the onset (formula 4).

$$R_i = P * I * A \quad (4)$$

where R_i – the value of the degree of danger of the i -th threat of the company;

P – the probability of the occurrence of the i -th threat;

I – Strength of the impact of the i -th threat on the security;

A – The consequences of the i -th threat.

Based on this method, Table 5 is presented below, which contains the necessary conditions for assessing threats to the financial security of an insurance company.

Table 5. Factors for assessing threats to the financial security of an insurance company

Probability of a threat	Point	Impact on security	Point	Threat consequences	Point
Most likely to happen	10	Extremely High Impact	10	Critical consequences	10
Very likely	8-9	High impact	8-9	Serious consequences	7-9
Non relevant, but possible	5-7	Moderate impact	5-7	Moderate consequences	4-6
Unlikely	2-4	Low impact	2-4	Minor consequences	1-3
Hardly possible	0-1	Extremely low impact	0-1		

Source: own research

For a more objective assessment of the degree of danger of the impact of threats on the financial security of the insurance company, it is recommended to conduct an expert assessment (Hilkevics and Semakina, 2019).

This method will help evaluate each threat in three directions: the probability of occurrence, the strength of the impact, and the consequences of the threat. Also, for the reliability of the opinions of experts at this stage, it is possible to assess the consistency of opinions of experts by the already known method.

14th stage. Threat ranking. The results of internal control at this stage of risk assessment rank them according to the degree of danger of identified threats to the financial security of the insurance company. This stage will help to further determine the priority areas of the insurance company to increase the level of financial security by neutralizing or minimizing the impact of identified threats.

15th stage. Identification of measures to neutralize threats. After determining the financial security assessment, identifying and assessing the main threats, effective measures are drawn up aimed at increasing the financial security of the insurance company, as well as at neutralizing or minimizing the impact of financial security threats. Also, at this stage, in addition to the events themselves, the following may be indicated: the expected economic effect for the insurance company from the implementation of these measures; deadline for the implementation of activities; responsible persons (departments) for the implementation of activities; supposed financing of events, etc.

16th stage. Internal control of the results of the implementation of measures to neutralize threats. Monitoring the implementation of measures to increase financial security presented by the insurance company is carried out not only by the head of the economic security service of the insurance company, but also by the heads of departments who are responsible for the implementation of a particular event. Upon completion of the deadlines for the implementation of measures, each department provides reports on the work done, on the basis of which the effectiveness of measures to improve the financial security of the insurance company will be evaluated.

17th stage. Assessment of the effectiveness of the implemented measures. As noted above, the assessment of the effectiveness of the measures taken is based on the information provided on the measures taken. At this stage, the insurance company itself determines the methods and methods convenient for it to conduct internal control of evaluating the effectiveness of the measures taken. If the activities are ineffective, it is recommended that you return

to step 13 to determine new activities, taking into account the results obtained at this stage. If the measures taken have been effective, then a new assessment of the financial security of the insurance company is carried out again from the first stage.

4. Discussion

Despite all the complexity and painstaking work to identify certain aspects of financial security in the economic control system, the above internal control procedures not only optimize business processes at an early stage of their implementation, but also allow you to quickly make changes as a result of identifying various deviations, development of specific operational management recommendations for adjusting business processes (Luzina et al., 2019; Akhmetshin et al., 2019; Prodanova et al., 2019). Conducting the internal control of the business process related to the assessment of financial security, with the assessment of risks in insurance companies is relevant.

Conclusions

Thus, the presented algorithm for conducting internal control of the insurance company's financial security assessment will make it possible to comprehensively evaluate not only the main financial quantitative indicators of the insurance company, but also qualitative indicators, the degree of danger to financial security threats, the effectiveness of the proposed measures to increase the level of financial security of the insurance company. Such a mechanism of internal control will reveal the company's potential, strong and weak points, thereby making internal control more effective and useful to ensure the financial security of the insurance company.

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Aksana TURGAeva

Candidate of Economics, Assistant Professor, Assistant Professor of the Department «Economic security». Research interests – Control, economic security, financial security, risks, management accounting

ORCID ID: <https://orcid.org/0000-0002-8374-1706>

Liudmila KASHIRSKAYA

Professor, Doctor of the Economic Sciences, Financial University under the Government of the Russian Federation, Russia. Research interests – accounting expertise, state financial control, audit, departmental interaction, efficiency of activity.

ORCID ID: <https://orcid.org/0000-0002-0234-0223>

Yulia ZURNADZHYANTS

PhD in Economics, associate professor, of economics and health care management with postgraduate course, Astrakhan State Medical University. Expert in the theory of management of the health system, economic analysis of medical organizations and evaluation of their effectiveness. Research interests: economics, economic security in health care, economic analysis of medical organizations, efficiency assessment.

ORCID ID: <https://orcid.org/0000-0002-7820-9918>

Olga LATYSHEVA

Candidate of agricultural science, docent of the Faculty of Geography of Altai State University. Research interests: real estate valuation, financial security, insurance companies

ORCID ID: <https://orcid.org/0000-0001-9279-1943>

Irina PUSTOKHINA

Associate Professor, Entrepreneurship and Logistics Department, Plekhanov Russian University of Economics. Currently engaged in teaching economics and management disciplines at the Faculty of Marketing, Faculty of Trade Economics and Commodity Science and IBS-Plekhanov and research in the field of management, management control, logistics management, supply chain management, entrepreneurship and entrepreneurship education. Research interests: management, control, internal control systems, logistics, supply chain management, entrepreneurship, entrepreneurship training.

ORCID ID: <https://orcid.org/0000-0001-5480-8871>

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>

Register for an ORCID ID:

<https://orcid.org/register>

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PECULIARITIES OF SUSTAINABLE DEVELOPMENT OF ENTERPRISES IN THE CONTEXT OF DIGITAL TRANSFORMATION

Kateryna Andriushchenko ^{1*}, Andrii Buriachenko ², Olexandr Rozhko ³, Oksana Lavruk ⁴, Pavel Skok ⁵,
Yaroslava Hlushchenko ⁶, Yelyzaveta Muzychka ⁷, Nataliia Slavina ⁸, Olena Buchynska ⁹,
Viktoriia Kondarevych ¹⁰

^{1,2,9,10} SHEE Kyiv National Economic University named after Vadym Hetman, Department of Economics and Entrepreneurship, Peremogy ave., 54/1, Kyiv 03057, Ukraine

³ Taras Shevchenko National University of Kyiv, Vasylkivska street, 90 A, Kyiv 03022, Ukraine

^{4,8} State Agrarian and Engineering University in Podilya, Department of Management, Public Management and Administration, Schevchenko Str., 13, Kamianets-Podilskyi, Khmelnytskyi region 32300, Ukraine

⁵ State University of Infrastructure and Technology, Department of Economics, Marketing and Business Administration, Kyrylivska str., 9, Kyiv, Kyivs'ka oblast 04071, Ukraine

⁶ National Technologies University of Ukraine «Igor Sikorsky Polytechnic Institute», Department of Interbational Economics, Peremogy ave., 37, Kyiv, 03056, Ukraine

⁷ National University of Food Technologies, Department of Tourism and Hotel Business, Volodymyrska str., 68 Kyiv, Kyivs'ka oblast 0160, Ukraine

E-mail: ^{1*} katya373@i.ua (Corresponding author)

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Abstract. The key elements that contribute to the digital transformation of the enterprise in the context of the cross-industrial paradigm are outlined. On the basis of the proposed elements (development factor, rate of development, quality change density, multiplication factor), and by means of mathematical modelling, the effect of capturing the digital transformation of the enterprise in the bifurcation points is calculated. The totality of the presented developments allows us to predict the development and minimization of risks associated with digital transformation in the enterprise with all the ensuing consequences (stability, dynamics, transformation and forecast of its development vectors) and conclude that with the improvement of the quality of digital transformation, the efficiency of functioning of any production increases, i.e. an increase in quality by digital transformation by n times accompanies an increase in production efficiency by at least n times. This allows to minimize risks and predict enterprise activity taking into account the vector of its development — digital transformation. Under conditions of uncertainty, the use of the model will ensure the quality of the digital transformation of the enterprise from any level of development of companies.

Keywords: digital transformation of the enterprise; sustainable development; reduction of risks of transfusion; bifurcation points; digital technologies; cross-industrial paradigm; Internet of Things

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1. Introduction

The survey of general executives and top managers (only 825 respondents) conducted by company “Protiviti” in the fall of 2018 showed that their main task in 2019 would be to reduce the risks associated with the transformation of the enterprise in digital (Executive perspectives on Top risks, 2019). The report also highlighted the fact that 70% of enterprises involved in digitalization achieved their goals. The study found that in 2018, enterprises are investing \$ 1.3 trillion in digital transformation initiatives. Tragically, research tells us that 70% of these initiatives will not reach their stated goals. That equates to over \$900 billion worth of spend that will miss the mark. This is mismanagement on a colossal scale (Goodness et al., 2019).

Digitalization of processes is relevant not only at the level of individual enterprises: entire industries choose for themselves this way of development as the only opportunity to meet the conditions of the rapidly changing world. Due to this, the digital transformation of industry, retail, public sector and other areas today is changing the lives of every person and every company.

The positive effect of the introduction of IIoT (Industrial Internet of Things) is observed in the industry. The most obvious evidence of this is the increase in the number of devices connected to it. According to Verizon (in 2014, 1.2 billion devices were connected to the IIoT, and this figure is expected to increase to 5.4 billion by 2020 (Industrial Internet of Things (IIoT), 2019). Also, some financial assessments of the development of the IIoT (Columbus, 2018):

- Global Market Insights: world market IIoT (equipment, software, services) in 2015 was \$113.71 billion, in 2017 — \$312.79 billion; in the period from 2017 to 2023, this market will grow with an average annual rate of 14.36% and by 2023 it will amount to \$700.38 billion.
- Machina Research: By 2025, the world market for IIoT will reach 484 billion euros.
- Accenture: By 2030, the contribution of IIoT to the world economy in the monetary equivalent will be more than \$14 trillion, including up to \$6 trillion in the US and more than \$ 70bn in Germany.
- According to Business Insider, by the year 2025 there will be more than 55 billion gadgets connected to the Industrial Internet of Things (IIoT), while the population of the Earth will reach only 7.6 billion people, and total investment in the IoT from 2017 to 2025 will be more than \$15 trillion — for comparison, the US budget is \$3 trillion.

2. Literature survey

The theoretical and statistical studies of many scientists became the basis of this study. For the formation of the hypothesis of scientific knowledge at the methodological level, research and scientific publications in the field of enterprise digitalization were used.

The significance of the constant volatility of business conditions on an ongoing basis was relevant in any society and in any time (Jensen, 2000; Collins, 2001). In 19 century revolutionary innovations (such as cars and aircraft) have radically changed the entire industries. Within these innovative transformations, new companies were created, some were able to transform quickly and adopt new challenges that proved to be successful (Rouse, 1996).

Such business transformations are primarily due to fundamental changes (Rouse, 2005), to perform the same job, but in a different way or perform other types of work (Safrudin, Recker, 2013; Wang et al., 2020). These

transformations can be described as “orchestrated redesign of the genetic architecture of the cooperation” (Morgan, Page, 2008). It must also be taken into account that any changes and transformations in business involve a high degree of risk and often have a certain degree of damage (Safrudin, Recker, 2013; Tvaronavičienė, 2018; Murashbekov, 2019; Korauš et al., 2019; Makedon et al., 2019; Orynbasarova et al., 2019).

Different stakeholders are involved in the transformation of the enterprise, and as a rule, they affect a number of hierarchies of companies (Röglinger et al., 2016). Assuming the existence of such abilities as “dynamic abilities” that are associated with the integration, creation and development of company resources have the ability to change (Teece et al., 1997). The article (Bhattacharya, Seddon, 2009) raises four aspects: reframing (corporate vision), constraints (high productivity), regeneration (linking the corporation's governing body with the environment) and revival (employees). The disadvantages of this campaign are that the reason for the transformational processes in an enterprise is rapidly changing conditions (Someh et al., 2016), for example, the development of IT technologies. In the study (Downes, Nunes, 2013), particular attention is paid to innovations that contribute to the digital transformation of the enterprise, emphasizing that this applies to virtually all sectors of activity.

Digital technologies are described in the paper (Bharadwaj et al., 2013) as a combination of information, communication, computing and communication technologies that transform into other forms of product, product or service, business model and organizational forms (Fichman et al., 2014). That is why digital technologies are closely linked to innovation, contributing to the development of competition and the development of competitive environment both inside and outside the company (Downes, Nunes, 2013; Porter, Heppelmann, 2014). In the article “A Theory of Enterprise Transformation” (Rouse, 2005) attention is paid to the fact that technological discoveries have a great influence on the digital transformation of the enterprise. The researches (Morton, 1991; Petrenko et al., 2019; Prodani et al., 2019) discuss innovative technologies that affect the organization of work of enterprises and accelerate the digital transformation.

However, to date, we have no direction in the sustainable development of the digital transformation of enterprises in the context of the cross-industrial paradigm. Only a small amount of research is aimed at structuring and refining the concept of the digital transformation of the enterprise. In the article for 2015 (Henriette et al., 2015) author analyzed literary sources and focused on specific aspects of digital transformation, did not focus on identifying key elements for the sustainable development of enterprises' digital transformation in the context of the cross-industrial paradigm. Gerster (2017) analyzed views of various authors on the definition and classification of digital transformation in the field of information technology implementation. Unfortunately, not sufficient attention was paid to the studies of the risks associated with the formation of sustainable development of enterprises' digital transformation in the context of the cross-industrial paradigm.

A digital transformation in the context of a cross-industrial paradigm is the convergence of industrial technologies based on digitalization, which is a radically new stage of scientific and technological progress, which has no historical analogues in terms of its impact on human civilization, including primary information and communication digitalization; electronic data exchange with external partners; use of special software; own production of information and communication technologies and equipment; production and use of industrial robots and sensors. New industrial technologies, possessing tremendous potential to change the direction of technological development, at the same time have mixed social and environmental consequences. This is another challenge that requires the development of risk management mechanisms for digital transformation in the enterprise. The introduction of digital transformation in industry requires the use of tools for preliminary forecasting, explaining uncertainties, and making the most informed decisions.

That is why in this research we seek to combine the existing views of scientists in order to reduce the risks and identify the key elements that contribute to the digital transformation of enterprises in the context of the interdisciplinary paradigm.

3. Methods

The probability of achieving a high digital transformation from the components N_i , called hypotheses, which influence the quality of digital transformation, calculated according to the formulas for full probability, where $i = 1-9$ are health-related hypotheses; morality, creativity, activity, organization and assertiveness, education, professionalism; use of working time; competency and reassessment of hypotheses using the Bice formula showed that high digital transformation depends primarily on the professionalism, competence, creativity, rational use of working time of all participants who are involved in this process, as well as not losing sight of all other factors. By introducing into the composition of the components that determine the quality of digital transformation, intellectual potential, as the core basis of digital transformation. Considering the options when employees have one or another quality, they came to the conclusion that the digitalization of labor simultaneously with creativity enhances the result by 2 times. This technique allows you to increase the efficiency of using digital transformation and make the right decisions based on the reassessment of components and reduce the risks of digital transformation.

The results of the studies allowed us to consider the risks of digital transformation as an object of mathematical modeling. Noting: A - entering in a unit of time, B - leaving in a unit of time and C available in the considered system of flows C. The ratio of the ratio of the output stream to the digital system under consideration is the

digital transformation (DT) flows and $k = \frac{B}{A}$.

When determining the coefficient of the relations of the outgoing DT stream per unit time to the incoming, we introduce the concept of $K(t)$ — coefficient of development of the DT company as the ratio of DT at a given time to the value of DT at the initial time:

$$k(t) = (1 + \frac{t}{2} (1 - k))^{\frac{K}{K-1}}$$

$K'(t)$ - the rate of change in the quality of the enterprise DT, that is, as a time-differentiable coefficient of development;

$$K'(t) = -\frac{k}{2} (1 + \frac{t}{2} (1 - k))^{\frac{K}{K-1}}$$

$p(t)$ - the density of the enterprise's digital transformation as the ratio of the digital component of the enterprise (DT) to the total (analogue) activity over a certain period:

$$p(t) = \frac{DT}{C + A \cdot t - B \cdot t}$$

$q(t)$ - the multiplier of the increase of the digital transformation of the enterprise as an integrated time factor of the development of the DT:

$$q(t) = \int_0^t K(t) dt$$

In the study of the DT, the data A, B, C, which determines the experimental values of the investigated object in a period of five years, are determined, and the magnitudes characterizing its development (coefficient of development of DT, rate of development of DT, density of DT, multiplier of increase of DT) According to the results of the analysis, we obtain the data presented in Table 1 and Figure 1.

It can be seen from the study that, according to a number of indicators (development coefficient, development rate, growth factor), the DT is developing continuously in the direction of increasing or decreasing the quality indicator, and there is a gap in density, i.e. density, allows you to uniquely determine the bifurcation points, and the level of digital transformation makes it possible to improve the quality of this process from any level of development by the effect of "entrainment" in bifurcation points, i.e. the points of intersection of the zero level of transformation with other levels of development, determined by degree $p = \frac{k_0}{k_0 - 1}$.

Table 1. Calculations of the characteristics of the investigated object in the proposed method for the case $k = 2$, $B = 2A$, $A = C / 2$, $T = C$

Indexes	Time, year					
	0	1	2	3	4	5
Coefficient of development of DT ; $K(t)$	1	0,25	0	0,25	1	2,25
The rate of development of the DT $K'(t)$	-1	-0,5	0	0,25	1	1,5
Density change of quality of DT; $DT p(t)$	1	2		-2	-1	-0,33
Multiplication factor of DT; $(q)t$	0	0,59	0,67	0,75	1,34	2,92

Source: Developed by the authors

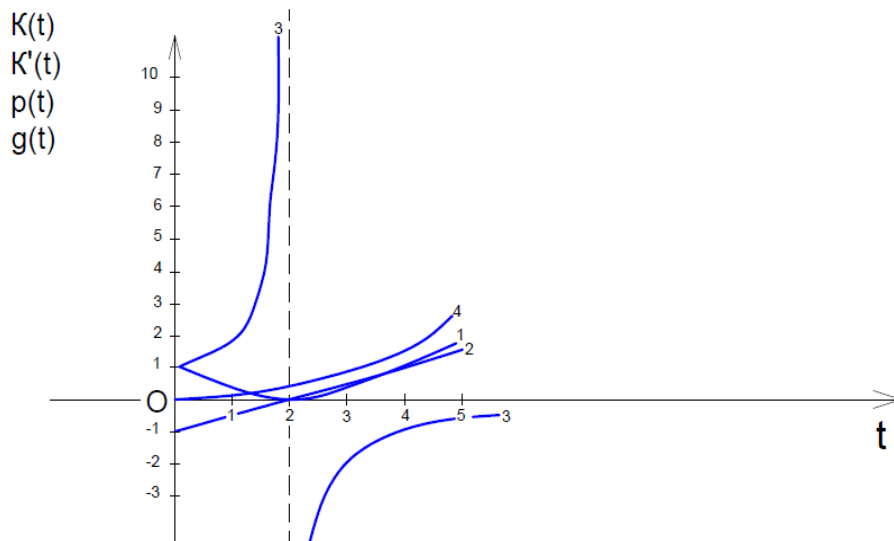


Figure 1. The level of transformation of the enterprise DT

Source: compiled by the authors

- 1- Coefficient of development of DT
- 2- The rate of development of the DT
- 3- Density change of quality of DT
- 4- Multiplication factor of DT

From the analysis of the obtained data, it follows, that according to a number of indicators (coefficient of development, the rate of development, density change of quality) the DT develops continuously in the direction of

increasing or decreasing the qualitative index, and the density is a gap, while $k > 1$ there is a scenario of digital transformation, and with a rupture 2nd kind in density at the point of bifurcation.

The larger k , that is, the more the exhilarating flow differs from the input per unit time, the faster the change, which is characterized by digital transformation, occurs.

Managing the process of digital transformation in time allows to eliminate the negative trends associated with the influence of the cross-industrial paradigm, an to bring the desired positive dynamics closer, and to obtain qualitative and efficient digital transformation.

Consequently, in the case of $B > A$, if $B > C$ is the transformation of the system with a displacement to the left of the bifurcation point $t_0 = \frac{C}{A(k-1)}$, $B < C$ - the transformation of the system with the displacement to the right of the bifurcation point $t_0 = \frac{C}{A(k-1)}$.

Thus, an increase in the quality of labour potential is observed when $t > \frac{C}{A(k-1)}$

The level of the digital transformation of an enterprise allows improving the quality of transformation from any level of development through the “capture effect” at bifurcation points (Figure 2). The main indicator characterizing the digital transformation is its density, which allows managing the security of transformation.

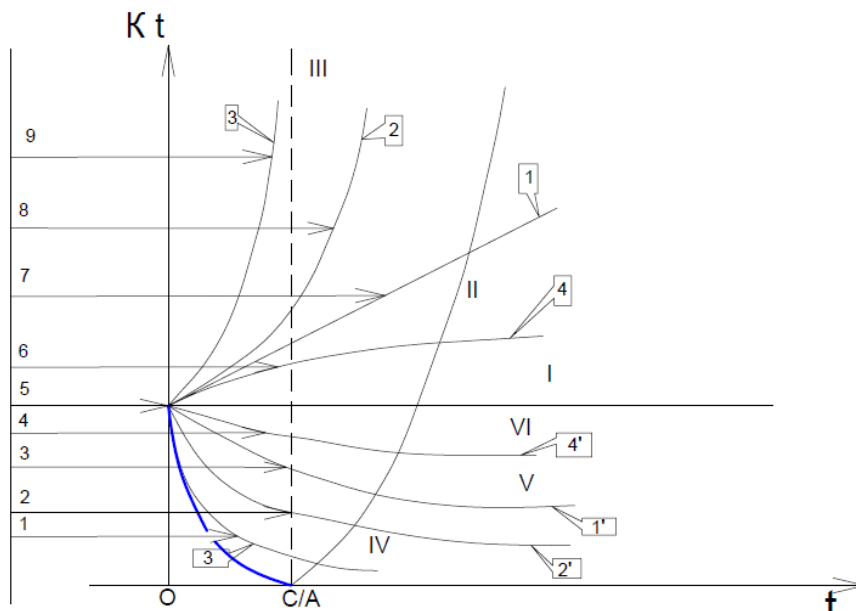


Figure 2. The effect of “capturing” the digital transformation of the enterprise at bifurcation points

Source: compiled by the authors

Thus, the introduction of a set of concepts: the density of the digital transformation of an enterprise, allows us to determine the bifurcation point of the investigated system, in which it is transformed, with continuous changes $K(t)$, $K'(t)$, $q(t)$ properties of the system itself.

The combination of the presented developments allows predicting the risks associated with the digital transformation of an enterprise in the context of a cross-industrial paradigm with all the ensuing consequences of

the sustainability, dynamics, transformation and forecast of its development vectors. And to conclude that with the digital transformation, the efficiency of any production increases, i.e. the digitalization process of the enterprise n times accompanies the increase in production efficiency not less than n times.

The completed studies aimed at studying the classification system, conceptual scheme, security density, digital transformation of an enterprise and allow us to draw the following conclusions:

1. The authors' economic and mathematical model is scientifically substantiated, based on indicators: the coefficient of development of DH, the speed of development of DH, the density of changes in the quality of DH, the growth factor of DH that allows you to predict the risks of digital transformation of an enterprise in the context of a cross-industrial paradigm.

2. It is advisable to develop measures aimed at improving such quality indicators, as: the process of training and internships, the development of programs, training reserve managers, taking into account the level of their training and ability to adapt, allowing not only to increase the efficiency of digital transformation of the enterprise, but also make the right decisions based on revaluation of components.

Theoretical and practical results obtained in the course of the work can be used to reduce the risks associated with the digital transformation of the enterprise in the context of the cross - industrial paradigm.

The totality of the presented developments allows us to predict the development and minimization of risks associated with digital transformation in the enterprise with all the ensuing consequences (stability, dynamics, transformation and forecasting of its development vectors) and conclude that with an increase in the quality of digital transformation, the efficiency of operation of any production increases, i.e. an increase in quality by digital transformation by n times accompanies an increase in production efficiency by at least n times.

4. Results

The current stage of world economic and social development is characterized by a significant impact on digitalization. As a new trend in world social development, which has replaced informatization and computerization, it is characterized by the following - based on a digital representation of information, which, on the scale of economic and social life of an individual enterprise and the whole world, leads to an increase in the efficiency of the economy and an improvement in the quality of life.

The main task of minimizing risks during the implementation of the digitalization process at the enterprise is to determine the key indicators that affect (the coefficient of development of digital transformation, the speed of development of digital transformation, the density of change in the quality of digital transformation, the multiplier of the increase in digital transformation). A comprehensive disclosure of the characteristics of digital transformation as a modern trend in world development includes the disclosure of the essence of digitalization, the features of the digital presentation of information, the prerequisites and possible positive consequences of digitalization of enterprises, the ratio of challenges, threats, possible negative consequences and risks of digitalization for an enterprise, methods of measuring the degree of digitalization coverage of a particular country, and also includes a description of the current state and objectives of enterprise digitalization.

The importance of enterprises' digitalization processes is widely covered in research by modern scientists, so it is advisable to go directly to the definition of conditions conducive to the digitization of the enterprise. At the current stage, five key elements can be distinguished (Burke et al., 2017):

1. *Definition of a business strategy* should be made before the beginning of the investment. Often, enterprise executives want to improve efficiency by introducing digital technologies. However, they do not fulfill the main task, which is to change the strategy of the entire company, and not just the introduction of several tools.

No existing technology provides the speed of product development and its implementation. It is a combination of business strategy tools and determines the company's digitalization performance. For example, one of the major

trading companies of the Fung Brands Limited Group has developed a three-year enterprise digitization strategy, the main purpose of which is the definition of company services through a mobile application. The focus was on the following areas: speed, digitalization and innovation. The main tasks of the management determined the reduction of the production cycle, the growth of the speed of delivery of products to markets, as well as the establishment of efficiency of data use in the global supply chain. Next, it was necessary to decide what specific digital tools should be used. The company introduced the technology of online design. This helped to deliver goods more quickly to markets, as well as reduce design time by 50%. Thanks to digitization, the suppliers of this company had the opportunity, through their own systems, to track data in online mode to increase operational performance. An online platform, Total Sourcing, was created, focusing on both the company's customers and suppliers. The financial department also used this approach, which reduced the closing time of the period by more than 30%. It also made it possible to increase the efficiency of use of working capital by \$ 200 million. As a conclusion, such a single technology that generates "speed" and "innovation" simply does not exist. And for each enterprise, a set of tools for digitization will vary depending on the vision of their leadership.

2. *Engaging insiders.* Most companies in the business of digitization tend to attract external consultants, who often use the universal approaches that are already formed on the basis of best practices. However, it is worth attracting internal staff, because they are perfectly aware of all the shortcomings in the company's work and possible ways to eliminate them.

3. *Customer focus.* In order to increase the degree of customer satisfaction and increase their attraction it is necessary to begin to diagnose the needs of key clients of the company taking into account the strengths and weaknesses of the company. It is impossible to achieve these goals by attracting one tool. The most effective way to find out the customer's desire is to determine the reason for the loss of customers. And software that identifies a client-locked application helps software. Next, the company's employees should determine the reason for such a block.

4. *Recognition of workers' experiences before changes.* Typically, the company's digitization involves optimizing the number of employees. And when employees understand this, it's natural that they can resist unconsciously, or deliberately, such a transformation. When such changes are carried out inefficiently, company management often refuses to introduce further changes and this does not affect the number of staff. Therefore, in order to avoid sabotage of the team, it is important to conduct an information campaign within the enterprise and emphasize that the digitalization of business processes enables to improve the knowledge and skills of the same workers and adapt them to changes in the labor market.

5. *Implement the Silicon Valley Management System at the enterprise.* Silicon Valley startups are known for operational decision-making, high-speed prototyping, and mobile organizational structures. The Silicon Valley control system can be characterized by several elements:

- changes need to be made quickly, and later corrected;
- managerial decisions should be made quickly;
- the employees of the organization should be involved in the process.

The consumer, the state, as well as the business environment, are in the process of digitization. This transformation is associated, first of all, with the development of scientific and technological progress, which caused the need for the emergence of new business models (Table 2). Highly productive enterprises in which digitalization has already taken place, to improve business models, spent in 2017 34% of its IT budget for digital modernization; according to forecasts in 2018, this figure will increase to 44% (Da Silva Freitas Junior, Gastaud Macada, Brinkhues, 2017).

Table 2. Comparative characteristics of IoT (Internet of Things) and traditional automation

Sign	IoT	Telemetry of automated control system of technological processes
Object of management	A cross-industry cross-industrial value added process that covers all its participants	Separate production area, functional part, set of processes of one enterprise
Result	Significant growth in labor productivity of all participants in the value-added chain due to ten times (as a rule) growth in resource utilization and corresponding cost reductions	Growth of labor productivity at selected sites, insignificant (per unit of percentage) increase of efficiency of an individual enterprise
Transformational influence	The cardinal transformation of production and business processes, the type of products / services, the nature of socio-economic relations	Absent
The ideology of the management system	Open	Proprietary
Affiliation management system	Cross-industrial ecosystem	An enterprise or group of companies with a common ownership structure
Terms of implementation	Weeks and months (connection, not implementation)	Years
Variability of the control system	Absent (algorithms are optimized independently)	Discrete, with a step in a few years

Source: Developed by the authors

The advantages of digitization of business processes in the enterprise:

1. Improvement of client experience. Customers are one of the key drivers of digitalization. Each day they interact with commercial and public companies, many of which have already begun to transform their activities. In such cases, the client sees that modern technology makes processes faster and easier, and therefore expects such changes from other enterprises as well. Digitalization technologies allow you to create the most personalized interaction that most customers prefer. Digital communication channels, multichannel retailing, artificial intelligence, robotics - with all this we are already faced in our daily lives. For example, the digital transformation of banks could not do without chat rooms, and pharmaceuticals are actively using modern mobile devices. Under client experience, we understand not only the interaction with the company of external customers, but also internal customers. The digital transformation of processes optimizes the work of the company's employees, which increases the productivity of each individual member of the team. For example, automating routine operations provides more time for solving really important and complex tasks.

2. Flexibility and acceleration of business processes. There is a saying: "Companies are fast or dead." In a digital economy, this phrase is more than relevant: if an enterprise does not use the capabilities of modern technology, it does not adapt to the pace and peculiarities of doing business, it will not be able to compete with those who already do it. To be successful, you need to be fast and flexible: not when it is possible, but when there is a need. The digital transformation of business processes is aimed at ensuring that companies quickly make decisions, quickly adapt work to the requirements of the current moment and satisfy the needs of customers.

3. Innovative opportunities for business development. Digitalization of business opens the way to innovative ways of enterprise development:

- cloud technologies allow one project to work on several teams simultaneously and effectively use the resources of the company;
- using the Mobile First strategy, the company receives and monetizes mobile traffic, which has already caught up with traffic from stationary devices;
- ready solutions allow you to save time on solving problems: various programs, extensions and connectors optimize the company's work and require minimal time spent on their implementation and adaptation.

All these and other technologies of digital transformation have made the entry threshold lower in many spheres of the economy. Starting your own business and developing it has become easier due to the huge number of tools that provide digitalization of industries and enterprises.

4. Use of modern technologies for working with data. Information is a key resource in the modern world. Fierce humanity generates enormous arrays of digital data, which not only occupy a place in the vaults but also help companies to conduct business. To take full advantage of the information available, you need to accumulate structure and analyze it. The digital transformation of the enterprise contributes to this through advanced technologies such as Big Data (Large Data) or Artificial Intelligence (AI, Artificial Intelligence). They are aimed at processing information flows, on the basis of which it is possible to make decisions, adapt proposals to specific clients and predict their behavior.

5. Partnership and cooperation. It is difficult to imagine a successful modern business without partners. Digitization opens up new opportunities for collaboration with other companies - and these opportunities are really amazing. For example, thanks to state-of-the-art technologies, geography is no longer an impediment to work: doing business and looking for partners can be anywhere in the world. Open API makes collaboration even easier and more convenient. For example, in the digitalization of finance, including banking, software interfaces have been used for several years. It is also worth remembering that without digitalization it's impossible to become better or to work with the best. Leading companies are already implementing digital transformation strategies and want to collaborate with those who are in line with their level of development and share their values. To the disadvantages, we can attribute such a sign, as the level of production depends on the used digital technologies. As the automation and rotation of production, production personnel are increasingly eliminated from making corrective solutions, reducing its ability to operationalize production processes (Andriushchenko et al., 2019a).

Therefore, the damage from the failure of digital systems can be more significant than with the traditional model of management of production processes. This puts forward increased requirements for digital technology. They become a decisive factor in production, which depends not only on the efficiency of processes in an enterprise but also on the possibility of their implementation, which depends on reliability and stability. In Germany, the methodology and practice of digital transformation are quite successful. In 2011, under the "High-tech Strategy 2020" plan, the German Government initiated the "Industry 4.0" project, which is based on the creation of cyber-physical systems capable of solving any production tasks, where monotonous work is currently used workers (Andriushchenko et al, 2019c).

That is, in the program of "digital economy in German" in the first place is still not a "figure", but "economy", "production". Digitization of the same production and management is only an auxiliary (albeit very important) instrument. In the future, the key driver of growth will be the continued decline in the cost of sensors and equipment, communications services, data processing and system integration (Yoo et al., 2012). The total number of connected devices in the world by 2019 will reach about 530 million units. At the same time, the largest number of such devices will be in the energy and housing and communal services sectors, in transport, industry, health and trade (Figure 3).

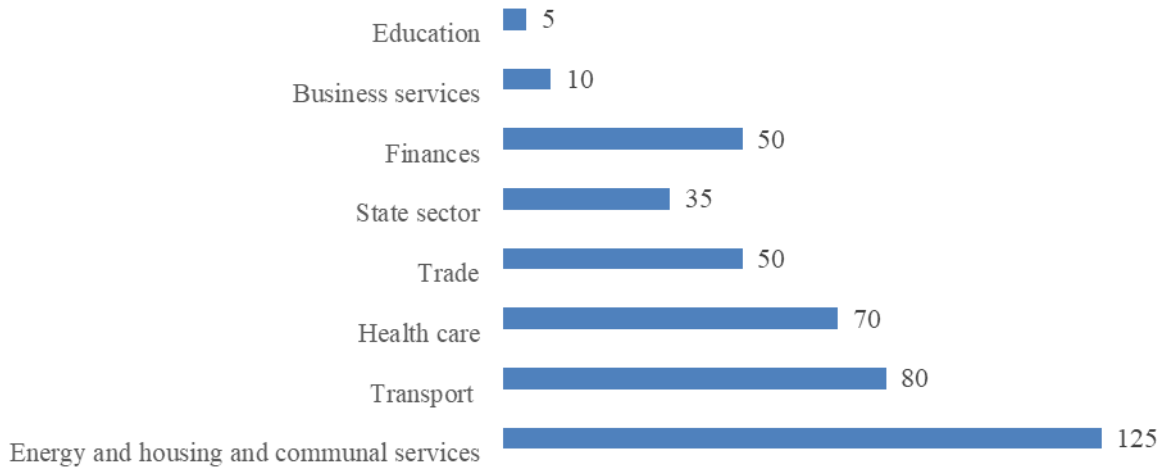


Figure 3. Number of interconnection devices in the main sectors of the world economy in 2019, million pcs.

Source: compiled by the authors on the basis of (Goodness et al., 2019)

The revenues of the global industrial market IIoT (Industrial Internet of Things) will reach 484 billion Euros in 2025, and the main sectors where this concept will be implemented will be transport, industry, utilities, and health (Figure 4).

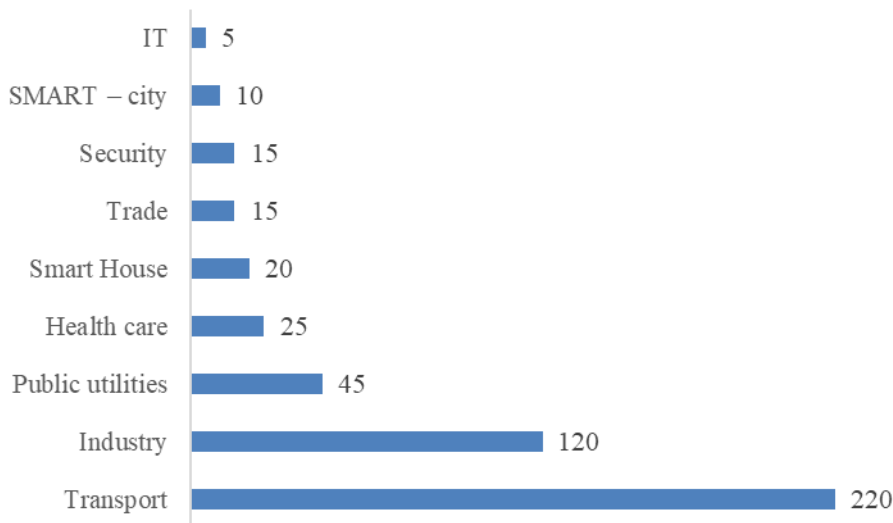


Figure 4. Revenues of the Internet market in the main sectors of the world economy in 2025, billion Euros.

Source: compiled by the authors on the basis of (Goodness et al., 2019)

An economic strategy aimed at increasing the competitiveness of companies, increasing the share of products in the domestic and foreign markets, growth of their income and, ultimately, GDP growth of the country, may be based on initiatives on the development of Internet tools, as an instrument for increasing the competitiveness of existing business, increasing the effectiveness of the management of state-owned objects, the creation of new

products and solutions in the field of Internet technologies and related industries, as well as the creation of new markets and products but based on these solutions.

5. Discussion

When developing strategic initiatives related to the development of technologies and products of IIoT (Industrial Internet of Things), it is necessary to take into account that in order to improve the efficiency and create the technological basis for standardization and automation of new markets, they must horizontally cross all vertical sectoral markets of countries, new promising market segments and technological strategies. The programs for the development of new markets and technologies are being developed in various developed countries at the state level and private companies (Figure 5). In addition, various sectoral strategies are developed at the state and sectoral associations level for the short and medium term. This is the development of both industry, electronics and information technology, and others that will be closely linked to the development of technologies IIoT (Industrial Internet of Things).

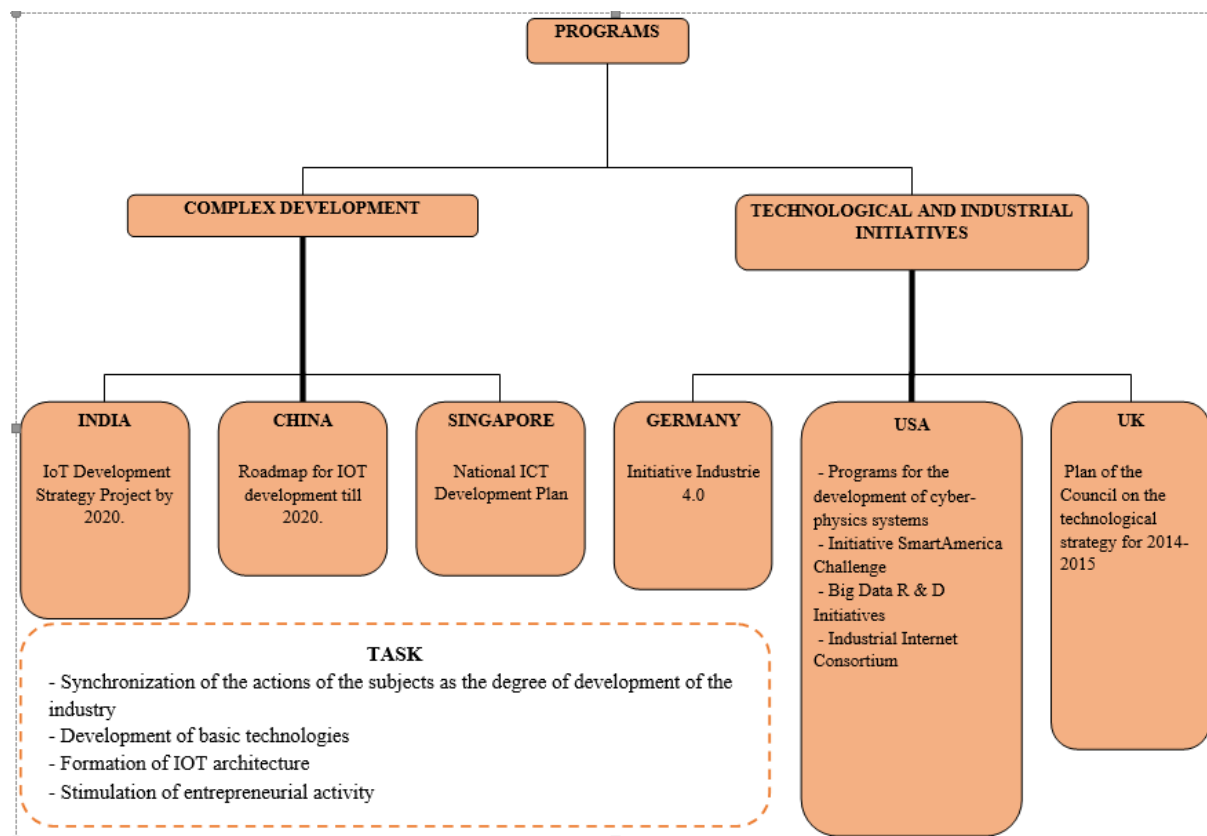


Figure 5. State Programs for Online Support, grouped by country

Source: compiled by the authors on the basis of (Alexander, D. and K. Lyytinen, 2017)

Thus, the digitization of an enterprise in German (and not only German) practice is aimed, first of all, at conducting "new industrialization". It is implemented not by expanding existing products and creating their analogues on the basis of modernization, but by creating new enterprises on a new technological basis, based on the "figure". This allows achieving the objectives of the German strategy, among which: "providing high quality

end-services or products with the least value in any quantity: both large and small; wide customization of products under the condition of flexible production; introduction of methods of self-optimization, self-adjustment and self-diagnosis" (Andriushchenko et al., 2018).

A similar view of digitalisation, as an instrument for improving the efficiency of economic, in particular - industrial, is also observed in other countries. In same Germany, the main emphasis is on optimizing production, developing technologies to increase the efficiency of industry and expansion into world markets. In the US, businesses focus on business models based on digital data processing, and on the implementation of IT-platforms management. Japan has taken a course on a combination of optimization of production and the introduction of new digital business models. China is trying to technically upgrade, modernize production with the use of modern digital equipment.

Conclusions

The digitalization of the enterprise is essential for today and offers great opportunities both for companies and for the society at the expense of new business models, or by creating new forms. In order to take advantage of these opportunities, companies and employees of the company must be able to change themselves. To a greater extent, the digitalization of the enterprise focuses on the business process (operational activities), which broadly includes: changes in products, processes, organizational structure and management concepts, thus transforming into a company strategy (Andriushchenko et al., 2019b).

The digital transformation of the enterprise is considered by us as the modern stage of the information revolution, the specificity of which is to expand the practice of using data in a discrete (digital) form. Digitization affects different aspects of social development, but the most significant transformations are expected in the industry, which has a qualitative upgrade, including the transition to cross-industrial digital production economical systems.

Due to the technical and organizational complexity of the formation of such economical systems, the high risks of their development and successful implementation, the state plays an important role in the work on the digitization of industry. The significance of state regulation and support of new digital technologies is confirmed by both domestic and foreign experience. As a result, measures to digitize the industry should be incorporated into the state industrial policy. This will allow at the expense of digitization to solve the urgent tasks of accelerating industrial growth, the creation of import-substituting industries, the increase of labour productivity in industry, and so on.

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Kateryna ANDRIUSHCHENKO, Doctor of Economic Sciences, Professor, Department of Economics and Entrepreneurship, SHEE Kyiv National Economic University named after Vadym Hetman
ORCID ID: <https://orcid.org/0000-0002-6274-5310>

Andrii BURIACHENKO, Doctor of Economic Sciences, Professor Department of Finance, SHEE Kyiv National Economic University named after Vadym Hetman,
ORCID ID: <https://orcid.org/0000-0002-7354-7491>

Olexandr ROZHKO, Doctor of Economic Sciences, Professor, Vice-rector for scientific and pedagogical work (prospective development) Taras Shevchenko National University of Kyiv
ORCID ID: <http://orcid.org/0000-0001-8415-2084>

Oksana LAVRUK, PhD in Economics, Associate Professor Department of Management, Public Management and Administration, State Agrarian and Engineering University in Podilya, Kamianets-Podilskiy
ORCID ID: <https://orcid.org/0000-0001-9089-237X>

Pavel SKOK, PhD in Public Administration, Pro-Rector on Research, Associate Professor Department of Economics, Marketing and Business Administration, State University of Infrastructure and Technology
ORCID ID: <http://orcid.org/0000-0003-2387-9946>

Yaroslava HLUSHCHENKO, PhD in Economics, Associate Professor Department of of Interbational Economics, National Technologies University of Ukraine, Igor Sikorsky Polytechnic Institute
ORCID ID: <http://orcid.org/0000-0003-1454-0369>

Yelyzaveta MUZYCHKA, PhD in Economics, Senior Lecturer Department of Tourism and Hotel Business, National University of Food Technologies
ORCID ID: <https://orcid.org/0000-0003-3640-0404>

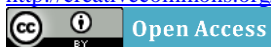
Nataliia SLAVINA, PhD in Economics, Associate Professor Department of Management, Public Management and Administration, State Agrarian and Engineering University in Podilya
ORCID ID: <https://orcid.org/0000-0002-3761-9865>

Olena BUCHYNSKA, PhD, Senior Lecturer Department of marketing, SHEE Kyiv national economic university named after Vadym Hetman
ORCID ID: <https://orcid.org/0000-0003-2991-2110>

Viktoriia KONDAREVYCH, PhD-student at Economy and Entrepreneurship Department SHEE Kyiv National Economic University named after Vadym Hetman
ORCID ID: <https://orcid.org/0000-0002-9775-4196>

Register for an ORCID ID:
<https://orcid.org/register>

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FEATURES OF THE COHERENT PRESENTATION OF INFORMATION IN ORDER TO PREPARE INTEGRATED CORPORATE REPORTING

Natalia A. Prodanova ^{*1}, Natalia V. Savina ², Vadim A. Dikikh ³, Yulianna I. Enina ⁴,
Olga Yu. Voronkova ⁵, Vladimir V. Nosov ⁶

¹ Plekhanov Russian University of Economics, Stremyanny lane, 36, Moscow, 117997, Russian Federation

² Financial University under the Government of the Russian Federation, Leningradsky, 49 Prospect, Moscow, 125993, Russian Federation

³ Moscow City Teacher Training University, 2nd Agricultural fare, 4, 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 K.G. Razumovsky Moscow State University of technologies and management (the First Cossack University) (RAZUMOVSKY MSUTM (FCU)), 109004, st. Ground Val, 73, Moscow, Russian Federation

⁶ Academy of the Investigative Committee of the Russian Federation, Moscow, Russian Federation

E-mails: ^{*1} prodanova-00@mail.ru (Corresponding author)

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Abstract. Complex, diverse, multidirectional institutional processes taking place around the world have led to the fact that in modern conditions, priority direction of disclosure of information about the activities of the reporting entity to its stakeholders is integrated corporate reporting, which increasingly acts as a new effective management tool of the organization, providing the necessary information coherence and completeness of disclosure of information about sustainable business development. The authors analyzed three main types of elements combination providing different connectivity of the final report: centered, distributed and mixed, and determined approaches to the integration of information taking into account the interests of interested reporting users. Recommendations on methodological support for the preparation of integrated corporate reporting allow us to introduce an innovative approach to formalization of reports, and to ensure comparability and consistency of the presentation of accounting data at the strategic level.

Keywords: integrated corporate reporting; information; stakeholders; integration perimeter

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1. Introduction

Russia's integration into the world economic system not only expands opportunities, but also naturally increases the variability of economic conditions. For organizations, this means the need to constantly seek new ways to increase competitiveness, growth directions and sources of investment. In these conditions, information requests of people interested in the effectiveness and efficiency of the business inevitably grow. Until recently, the main primary source of obtaining financial information by stakeholders was accounting (financial) statements. Exactly it was considered as the main, final, highest stage of accounting generalization of information, a kind of “calling card” of an economic entity (Kachkova, 2014). Indicators of accounting (financial) statements even now largely determine the correctness and timeliness of management decisions made by external users, the possibility of attracting additional investment, the market valuation of the business. However, in current conditions, new forms and methods of information disclosure and business transparency are required.

In the field of accounting, only two systems of standards make it possible to prepare statements that are internationally recognized (i.e. accepted by most users around the world). “Firstly, these are financial statements prepared following IFRS (International Financial Reporting Standards), and secondly, financial statements prepared following American standards (US GAAP)” (Bondarchuk, 2006).

Only partially it is possible to agree with this point, since the reporting generated following the principles of IFRS is not immune from errors, since its preparation depends entirely on the professional judgment of the accountant who compiles these statements. GAAP standards are not devoid of problematic aspects too, despite their recognition by many global corporations, which can also lead to errors in report generation.

One of the leading modern trends in the development of accounting is to create a unified international model that ensures the formation of reliable accounting data. Meanwhile, “the accounting standards of countries with developed market economies (and international standards, as a generalization of the experience of various accounting systems) focus on the needs of investors” (Rakevich, 2012). However, the diversity of information needs is not limited to the issue of assessing the investment attractiveness of the business.

Financial statements prepared in accordance with IFRS are starting to lose their relevance for users today. This is mainly because they reflect the financial position and financial results of the company for periods that have already occurred and do not take into account its risks and future development strategy.

One of the most promising ways to solve this problem is to create fundamentally new reporting models that are built at the intersection of both financial and non-financial information about the company's activities (Guseva, 2013; Ermekbaeva et al., 2018; Nelyubina et al., 2016; Tarman, 2016, 2018; Kuznetsova et al., 2019; Jones, 2019; Yemelyanov et al., 2018; Magsumov, 2019; Popova et al., 2019; Suieubayeva and Utegenova, 2020; Vigliarolo, 2020; Chehabeddine, Tvaronavičienė, 2020). Therefore, it should be recognized that in current conditions the concept of reporting should not be formed merely based on the best world practices for standardization of accounting (financial) statements.

2. Literature review

Recently, there have been ongoing studies on various options for the integration of information and methods for creating the relationship of parts of integrated corporate reporting. Thus, studies conducted by E. Hutton (Hutton, 2004), R. Bergman, and J. Ross (Bergman, Ross, 2007) emphasize the integration of financial information with various non-financial data, which allows us to concentrate on the main financial drivers of value creation. M.

Pedrini (Pedrini, 2007) rightly points out that the so-called global or general report successfully integrates information from social reporting and reporting on intellectual capital. A similar line of reasoning, presented with a different emphasis, can be found in the studies of scientists M. Cordazzo (Cordazzo, 2005) and D. Branwijck (Branwijck, 2012). The idea of close relationship of social reporting and reports of boards of directors was considered by A. Kolk and J. Pinsk (Kolk, Pinkse, 2010).

Taking into consideration the strategic perspective of presenting non-financial information, K. Yongvanich and J. Guthrie (Yongvanich., Guthrie, 2006) noted that social and intellectual capital reporting should be disclosed in close conjunction with performance measurement issues, in particular through a well-known balanced scorecard (Korableva and Kalimullina, 2016). The need for a combination of heterogeneous information is indicated in the works of the famous Western scientist R.J. Eccles (Eccles, Krzus, 2010).

He notes the importance of integrating financial data presented in accounting (financial) statements with a wide range of indicators from non-financial reports. Information such as intangible assets, key performance indicators, corporate governance, etc. are proposed to be included as non-financial supplementary data (Eccles and Krzus, 2010; Osadchy et al., 2018; Kashirskaya et al., 2019; Singareddy et al., 2019; Kolupaev et al., 2019; Da Costa et al., 2019; Bisultanova et al., 2018). Agreeing with the provisions of the conceptual basis for the preparation of integrated corporate reporting, Eccles and Krzus emphasize the importance of integrative thinking, which allows combining in single document information from different reports that are inconsistent by presentation formats and often poorly formalized.

Connectivity is not only one of the most important principles for preparing integrated corporate reporting, but it is also a significant feature that distinguishes it from other types of reporting. The very use of the term “integrated corporate reporting” suggests that such reporting involves a complex semantic and meaningful combination of various kinds of information.

3. Methods

As part of the study, an analysis of domestic experience in the formation of the perimeter of the integration of corporate reporting information was carried out. System analysis, empirical research, principles of formal logic, synthesis and analysis of theoretical and practical material were used as research tools.

4. Results

The process of harmonization, standardization, convergence, transformation of the accounting system is global in nature (Khusainova, 2018; Saenko et al., 2019; Akhmetshin, 2015; Sharafutdinov et al., 2019). The concept of corporate reporting is increasingly used throughout the world. Russian authors also use this term more frequently. The requirements for ensuring transparency of corporate reporting dictate new approaches to modeling external reporting, organizing rational collection, and classification of information for various user groups; identification of risks to manage them and reduce the impact of their consequences, etc. (Chistyakova, 2010).

In this regard, the requirements for the quality of both source information and information contained in corporate reporting are significantly increasing (Filippov, 2009). The current system of indicators should be determined based on the interests of users of these reports, on the one hand, and corporate governance tasks, on the other. In contrast to the usual accounting (financial) statements, corporate reporting should contain mostly qualitative characteristics (Aboyantseva, 2012).

According to the research, one of the most promising forms of presenting information as corporate reporting is integrated reporting, combining financial and non-financial data, allowing the reporting user to form an opinion on the performance of an economic entity in accordance with two fundamental principles: the continuity of the value creation process and sustainable development of an economic entity (Hilkevics and Semakina, 2019; Luzina et al., 2019; Feofanovich, 2019; Smolnikova et al., 2019; Rahman, 2017; Ishchenko and Magsumov, 2019; Aleksandrova et al., 2017). Russian business is increasingly using integrated corporate reporting as the basis for presenting information to interested parties. The international integrated reporting standard defines the purpose of information disclosure for various user groups.

In our opinion, such a task should play a vital role in the process of data integration, combining the coherent elements of the disclosure of the chain of capital used to obtain added value. The integration of information based on a retrospective and perspective approach, presented in Figure 1, will allow you to create the accounting field needed to create integrated corporate reporting, taking into account the information needs of users and the development strategy of the organization.

Disclosure of information to interested parties requires research into the applied issues of organizing the process of preparing and presenting integrated corporate reporting in Russian conditions. Disclosing information to interested parties requires research into the applied aspects of organizing the process of preparing and presenting integrated corporate reporting in Russian terms. One of them is connected with the right choice of effective organization of the process of integration and data consolidation for the formation of integrated corporate reporting.

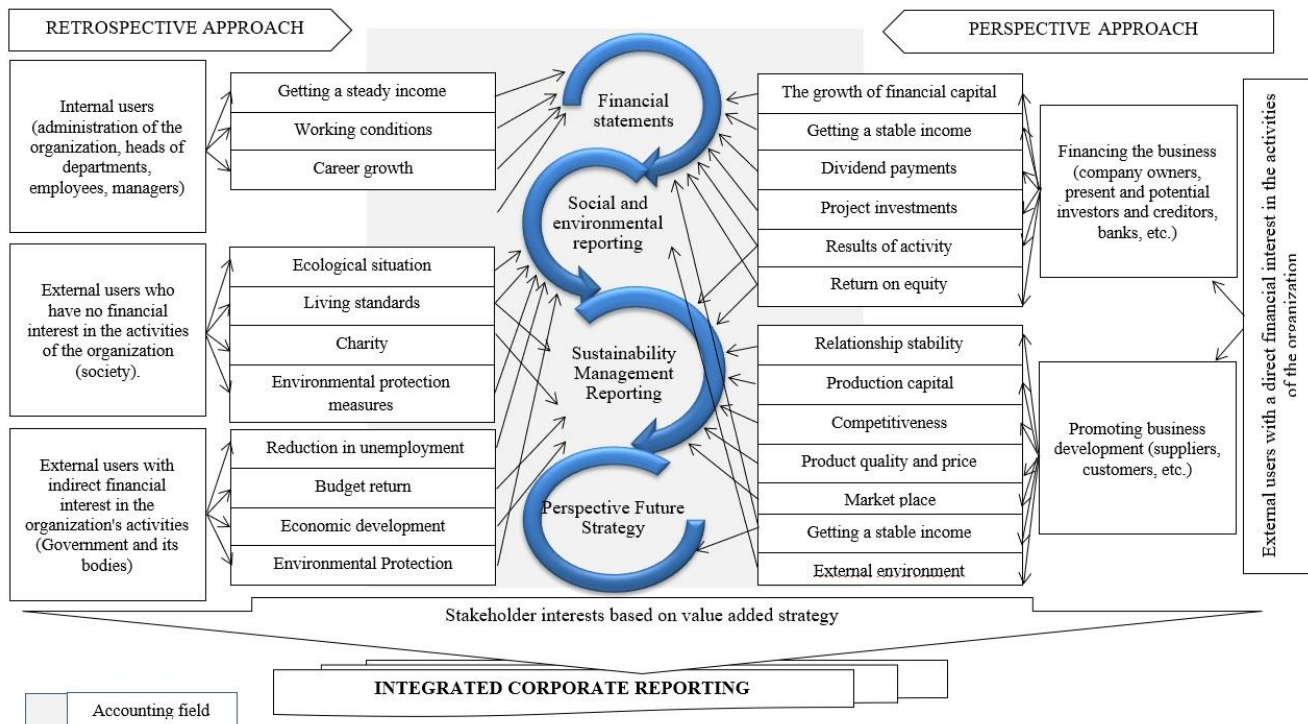


Fig. 1. Creating an information field for the preparation of integrated corporate reporting

Source: compiled by the authors (Bochkareva, 2018)

According to paragraphs 3.10 and 3.11 of the conceptual framework for preparation of integrated corporate reporting, the following information components can be distinguished that are somehow interconnected:

- substantive elements: overview of the organization and the external environment, senior management, opportunities and risks, strategy and resource allocation, business model, performance and prospects;
- time: past, present and future;
- capitals: financial, industrial, intellectual, social and relative, human and natural;
- financial and non-financial information;
- qualitative and quantitative information;
- internal management information, information for boards of directors, information for external reports;
- integrated report information, other internal and additional external information.

For the purposes of this study, a separate element of the integrated report, which has a relatively independent value and carries a certain semantic load, will be called an internal element (part) of the integrated corporate reporting. Substantially, such an element should disclose information on the use of a particular type of capital, or be an autonomously perceived component of the general report (final report), which reflects information on an internally homogeneous range of issues. In documents related to integrated corporate reporting, the element is also called a private report (Bochkareva, 2018).

If, following the developers of the concept of integrated corporate reporting, we consider the integrated report as a document disclosing comprehensive information about organization's creation of added value, then its various elements (parts) can serve as a representation of key areas (positions) where this process is implemented.

In accordance with the conceptual framework of integrated corporate reporting preparation, they can be compiled both independently as original sources of various information, and in combination when they are presented from the perspective of a complete, holistic view of the business.

In the course of their activities, organizations can create a wide variety of reports, both required by law, and generated voluntarily to ensure better communication with stakeholders in order to meet the information needs of the latter (for example, accounting (financial) statements or a report on sustainable development).

If such additional reporting is generated alongside with integrated corporate reporting, it is advisable to include links to relevant reporting forms in the latter.

You can see that in practice, integrated corporate reporting and individual reports perform various functions. Initially, the main goal of preparing integrated reporting was to maximize the awareness of stakeholders about the organization's ability to create value. However, today, this goal is being considered in a broader context - to coherently and consistently demonstrate a "value creation history" and to reveal specific information about individual types of capital.

In this regard, the task of forming high-quality, reliable and properly structured integrated corporate reporting is of crucial methodological importance. Its effective solution is largely determined by the choice of the integration contour, through which the final report configuration will be formed, and the definition of the Central reporting link. Ultimately, the quality of the final report will be determined by the extent to which the different parts of the final report are related.

This issue remains unexplored by domestic scientists, who by default are leaning towards the financially-centered model, which is implicitly based on two basic premises:

- one of the information elements of the integrated report is the main, while the other elements are considered as complementary to it;

- accounting (financial) statements are taken as a starting point for the preparation of integrated corporate reporting.

6. Discussion

According to the developers of the concept of integrated corporate reporting, the boundaries of the integrated report should be aligned with the contours of the financial statements. Therefore, the main organizational units are reflected to the same extent as they are included in the financial statements. However, integrated reporting also covers the organization's areas of influence (economic, environmental and social) along the capitalization chain in the short, medium and long term. Areas of influence, as a rule, go beyond the boundaries of reporting. As will be shown below, such a model is not the only one possible and apparently it is not the most effective.

The level of integration of information when forming integrated corporate reporting is largely determined by how the report is constructed and how its parts are connected. In practice, there are three different approaches, each of which in its own way determines how reporting can be compiled: “centered”, “distributed”, and “mixed” connections. The explanation of the presence of three approaches at once is that the used combinations of parts of the integrated report allow to emphasize the features of possible industrial and national business practices.

The “centered” connection implies that integrated corporate reporting is formed on the basis of the key part of the reporting, which is considered as the main, “primary” one, while the remaining parts only strengthen the information contained in it. The latter are presented as secondary, and in the reporting structure are auxiliary in nature. Here we can distinguish two formation options.

The first is that the leading part of the report is the financial (accounting) component, the information content of which is increased through the inclusion of a social or environmental component.

The second option is to present integrated corporate reporting as an alternative to accounting (financial) statements, which focuses on social or environmental information, and the financial component is provided as a supplement.

In fact, the final report arising on the basis of such a combination cannot be considered as full-fledged integrated reporting due to the incompleteness and insufficient coherence of the parts presented. The main focus of such reporting is shifted to the information presented in the main part. At the same time, real integration, leading to increased user awareness, does not occur, but mechanical connection of the parts takes place without their internal coordination. In the case when the financial component is taken as the main part, such a report is generally reduced to expanded accounting (financial) statements. This approach prevails in Russian practice, where reporting is characterized primarily as a way of self-presentation, rather than a full-fledged communication channel for building relationships with stakeholders.

A “distributed” connection assumes that parts of a report are located in it “proportionally,” as it were, and each of them is created as a complete report that has independent value. Information from different parts complement each other. In contrast to the previous approach, the main, “leading” part, to which additional information is attached, is not allocated here. Instead, a relatively complete view is formed across all lines of accountability. Accordingly, each of the parts of the integrated report characterizes a certain area and has its own value.

At the same time, aggregation occurs mechanically, mainly due to the fact that the information contained in individual parts intersects multiple times within the final report or is actively used in other parts. This implies the formation of close mutual information links, which in some cases are redundant. The final integrated corporate

reporting in this case, although it is quite informative, still does not provide a comprehensive synthesis. Each of the parts characterizes a certain area without loss of independent value. It is included in the general report due to internal links and cross-references built, thanks to which it can be considered as an element of a single report. But these parts are not so much built in some coherent unity, through which a complete picture arises, as they are side by side, complementing each other. The final report in this case is a document containing a vast array of information that does not have the necessary coherence, and therefore does not provide proper disclosure of how the various elements of the capital involved in the business are able to generate the process of creating added value.

The final report is more aggregated than in the previous case, but its main drawback is its poor information content gathered from separate parts, it still does not include additional information regarding the one already contained in them.

A “mixed” connection assumes that parts of integrated corporate reporting are connected not by the basis of a separate area of information disclosure (for example, financial / accounting or environmental information, information on intellectual capital, etc.), but by the relationship with the business strategy or the creation process of value added in it. Accordingly, integrated corporate reporting is formed not as a set of independent reports, but as a holistic, sequentially built comprehensive document created on the basis of a balance between detailing and analyticity of the information presented in it. Respectively, it includes only the necessary, selected by the principle of materiality and significance relevant information, but not the entire set of data from individual non-financial and financial reports.

By narrowing the subject of information disclosure (as mentioned above, it is a business strategy or a characteristic of the process of creating value added by it), the “mixed” connection eliminates the information intersection, excessive detail and irrelevant information are also excluded. Thus, not only the requirement of integration of information content is implemented, but also the compliance of the final integrated corporate reporting with brevity.

A “mixed” connection represents the most optimal approach to the formation of integrated corporate reporting. In addition to the above, a few comments should be made regarding the relationship between integrated corporate reporting and other types of reporting. There is always a certain overlay of information area between different types of reports. So, you can see the relationship between social reporting and the report on intellectual capital, between the report of the Board of Directors and the Management report, etc. Many elements of non-financial information are increasingly used in accounting (financial) statements. The “centered” and “distributed” connections discussed above are built by directly incorporating elements of other types of reporting into integrated corporate reporting. Such inclusion is justified in some cases, but it inevitably leads to redundancy of information content, overload of integrated corporate reporting with details, background information and duplicate data.

The use of the brevity criterion suggests that the information contained in various reports, which are prepared independently, should be included in integrated corporate reporting only partially, without direct reference to the original source. Integrated corporate and other types of reporting should be formed separately, be autonomous. Since their functions are different, the information contained in them will be complementary, but, at the same time, it will also intersect.

While integrated corporate reporting provides a generalized holistic assessment of the business value creation process, other types of reporting reflect detailed information on various activities and types of capital used. The information contained in them is more specific and is aimed at “narrowed” informing stakeholders about different areas of doing business.

7. Conclusions

Thus, our study showed that while preparing non-financial reports, three combinations of elements connection can be used, providing different coherence of the final report: “centered”, “distributed” and, finally, “mixed” connection. Given the distinctive features of integrated corporate reporting, while constructing a report, we recommend that the optimal perimeter of data integration is considered to be a combination of “mixed” connection, where parts of integrated corporate reporting are connected not on the basis of a separate area of information disclosure, but on the basis of correlation with the business strategy or the process of creating added value in it.

It should be recognized that at the moment, the issue of the relationship between the information field of integrated corporate reporting and other types of reporting remains controversial, since research in this direction, as well as the practice of preparing integrated corporate reporting, has begun relatively recently. Nevertheless, the conclusions reached already provide some methodological support to the process of preparing integrated corporate reporting by Russian companies.

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Natalia PRODANOVA. Doctor of Economic Sciences, Professor, Basic department Financial Control, Analysis and Audit of the Main Control Department of Moscow, Plekhanov Russian University of Economics. Research interests - accounting, integrated reporting, financial control, control and audit in the field of procurement

ORCID ID: <https://orcid.org/0000-0001-5140-2702>

Natalia SAVINA. Doctor of Economic Sciences, associate Professor of Department of State Financial Control, Financial University under the Government of the Russian Federation. Research interests - accounting, integrated reporting, financial control, control and audit.

ORCID ID: <https://orcid.org/0000-0001-6297-5688>

Vadim DIKIKH. PhD in Economics, State and municipal administration and law, Moscow City Teacher Training University. Research interests - Investment management, property valuation, economics of organizations

ORCID ID: <https://orcid.org/0000-0001-5430-4868>

Yulianna ENINA. Assistant 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 management, corporate reporting. Research interests: management in dentistry, control, internal control systems.

ORCID ID: <https://orcid.org/0000-0003-2511-9027>

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>

Vladimir NOSOV. Doctor of Economics, Associate Professor. K.G. Razumovsky Moscow State University of technologies and management, Moscow, Russia, Moscow. Academy of the Investigative Committee of the Russian Federation, Moscow, Russia. Research interests: risk management in the sectors of the national economy.

ORCID ID: <https://orcid.org/0000-0001-6158-0924>

Register for an ORCID ID:

<https://orcid.org/register>

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WHERE BETA IS GOING – CASE OF VIET NAM HOTEL, AIRLINES AND TOURISM COMPANY GROUPS AFTER THE LOW INFLATION PERIOD

Tran Thi Bich Hang¹, Duong Thi Hong Nhung², Do Hong Nhung³, Dinh Tran Ngoc Huy⁴,
Nguyen Manh Hung⁵, Pham Minh Dat⁶

^{1,2,5,6} Thuongmai University, 79 Đường Hồ Tùng Mậu, Mai Dịch, Cầu Giấy, Hà Nội 122868, Ha Noi, Vietnam

³The National Economics University, Ha Noi, Vietnam

⁴ Banking University Ho Chi Minh city Vietnam – International University of Japan, 777 Minami Uonuma shi, Niigata, Japan

Emails: ¹ tranbichhang@tmu.edu.vn; ² nhungksdl@tmu.edu.vn; ³ nhungdh@gmail.com; ⁴ dtmhuy2010@gmail.com;
⁵ hung.nm@tmu.edu.vn; ⁶ minhdat@tmu.edu.vn

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Abstract. Tourism, airline, hotel are industries those can be affected much by environment and social risks. Vietnam hotel, entertainment, airline & tourism industries are growing fast and contributing much to the economic development and have been affected by inflation. This paper measures the volatility of market risk in Viet Nam Hotel, entertainment, airline & tourism industries after this low inflation environment (2015-2017). The main reason is the necessary role of these financial companies and their system in Vietnam in the economic development and growth in recent years always go with risk potential and risk control policies. This research paper aims to figure out how much increase or decrease in the market risk of Vietnam Hotel, entertainment, airline & tourism firms during the post-low inflation environment 2015-2017. First, by using quantitative combined with comparative data analysis method, we find out the risk level measured by equity beta mean values in the Hotel, entertainment, airline & tourism industries are acceptable, as they are lower than (<) 1. Then, one of its major findings is the comparison between risk level of hotel industry during the post-low inflation period 2015-2017 compared to those in the airline & tourism industries. In fact, the research findings show us market risk level of entertainment industry, one kind of financial risks, is the highest among 3 groups. Whereas risk fluctuation in airline & tourism industry is the highest. Finally, this paper provides some ideas that could provide companies and government more evidence in establishing their policies in governance. This is the complex task but the research results shows us warning that the market risk need to be controlled better during the post-low inflation period 2015-2017. And our conclusion part will recommend some policies and plans to deal with it.

Keywords: risk management; asset beta; financial crisis; airline & tourism industry; hotel industry; entertainment industry; macro policy

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JEL Classification: M21, N1

1. Introduction

Over many recent years (2006 until now), Viet Nam Hotel, entertainment, airline & tourism market are evaluated as one of active financial markets, which has certain positive effect for the economy and become one of vital players in the financial system of the nation.

The Vietnam economy experienced acceptable inflation (exhibit 1) during a long time (2009-2014) and it reached a low inflation rate of 0.6% in the year 2015. High inflation may harm the whole economy in general and Hotel, entertainment, airline & tourism sectors in specific whereas low inflation may stimulate the local economy by reducing borrowing interest rates. This is why we would like to see, what the real scenario of market risk level of financial sector in Vietnam is during the post-low inflation environment, i.e. 2015-2017 years.

This study will calculate and figure out whether the market risk level during the post-low inflation time (2015) has increased or decreased compared in three industries.

The paper is organized as follows: after the introduction it is the research issues, literature review, conceptual theories and methodology. Next, section 3 will cover main research findings/results. Section 4 gives us some risk analysis, then section 5 presents discussion and conclusion and policy suggestion will be in the section 6.

Research issues

The scope of this study embrace the following issues.

Issue 1: Whether the risk level of hotel, entertainment and tourism firms during post-low inflation period 2015-2017 increase or decrease considerably, especially under the debt leverage impact, shown by asset beta measure?

Issue 2: Because Viet Nam is an emerging and immature financial market and the stock market still in the starting stage, whether the dispersed distribution of beta values become large in the three industries, especially under the debt leverage impact, shown by asset beta measure.

Hypothesis for testing:

Because stock market and financial market in Vietnam is still young, the market risk level of hotel, entertainment and tourism companies can be high.

2. Literature review

Leverage and risk level of firms has certain correlation. First of all, Martin and Sweder (2012) pointed out that incentives embedded in the capital structure of banks contribute to systemic fragility, and so support the Basel III proposals towards less leverage and higher loss absorption capacity of capital. Najeb (2013) suggested a positive relationship between efficient stock markets and economic growth, both in short run and long run and there is evidence of an indirect transmission mechanism through the effect of stock market development on investment.

Yener et. all (2014) found evidence that unusually low interest rates over an extended period of time contributed to an increase in banks' risk. Mohamad et. all (2014) showed that by applying both ROA and ROE in the performance equation, financial risk is significant. Furthermore, by considering financial performance in the risk equation as endogenous, both ROA and ROE are significant. The implication of this result is that the inverse relation of financial risk and performance cannot be avoided; hence, the commercial banks together with the bank supervisors should make a trade-off between risk and performance.

Next, Emilios (2015) mentioned that bank leverage ratios are primarily seen as a microprudential measure that intends to increase bank resilience. Yet in today's environment of excessive liquidity due to very low interest rates and quantitative easing, bank leverage ratios should also be viewed as a key part of the macroprudential

framework. As such, it explains the role of the leverage cycle in causing financial instability and sheds light on the impact of leverage restraints on good bank governance and allocative efficiency.

Atousa and Shima (2015) found out the econometric results indicate that life insurance sector growth contributes positively to economic growth. Shevyakova et al. (2019) stressed impact of tourism industry on economic development of a country. Then, Gunarathna (2016) revealed that financial leverage positively correlate with financial risk. However, firm size negatively affects the financial risk.

Aykut (2016) suggested two main findings: (i) Credit risk and Foreign exchange rate have a positive and significant effect, but interest rate has insignificant effect on banking sector profitability, (ii) credit and market risk have a positive and significant effect on conditional bank stock return volatility. Then, Mojtaba and Davoud (2016) generated results show that public banks are more successful in using risk management tools in compared with private banks. More meaningful relationship has been found between financial risk management tools and shareholder wealth in public banks.

Last but not least, Riet (2017) mentioned that after the euro area crisis had subsided, the Governing Council of the ECB still faced a series of complex and evolving monetary policy challenges. As market volatility abated, but deflationary pressures emerged, the main task as from June 2014 became to design a sufficiently strong monetary stimulus that could reach market segments that were deprived of credit at reasonable costs and to counter the risk of a too prolonged period of low inflation. Hami (2017) showed that inflation has a negatively significant effect on financial depth and also positively significant effect on the ratio of total deposits in banking system to nominal GDP in Iran during the observation period. Last but not least, Lubos et. all (2018) confirmed that entrepreneurs who started their business because of money perceived the effects of crisis on their company's financial risk more intensely.

Finally, Chizoba et. all (2018) revealed that inflation rate had a positive but insignificant effect on insurance penetration of the Nigerian insurance industry. The implication is that the macroeconomic variable (inflation) increase the level of insurance penetration in Nigerian insurance industry but it increase was not significant. And Miguel et. all (2018) found a consistently negative and nonlinear effect of price increases on financial variables; in particular, it is statistically significant in the full sample of countries, significant in developing countries, and insignificant in developed countries. Marcelo (2018) observed that the use of unrealistic assumptions (Modernist perspective) in risk management increases model risk, and is thus not suitable for risk model estimation. However, the absolute lack of measurement of the Postmodernist paradigm can be too radical in the sense that, in the practical field, there is a crucial need for quantitative information to enable financial institutions and investors to protect their investments.

Conceptual theories

Positive sides of low inflation: Low (not negative) inflation reduces the potential of economic recession by enabling the labor market to adjust more quickly in a downturn, and reduces the risk that a liquidity trap prevents monetary policy from stabilizing the economy. This is explaining why many economists nowadays prefer a low and stable rate of inflation. It will help investment, encourage exports and prevent boom economy. The central bank can use monetary policies, for instance, increasing interest rates to reduce lending, control money supply or the Ministry of finance and the government can use tight fiscal policy (high tax) to achieve low inflation.

Negative side of low inflation: it leads to low aggregate demand and economic growth, recession potential and high unemployment. Production becomes less vibrant. Low inflation makes real wages higher. Workers can thus reduce the supply of labor and increase rest time. On the other hand, low product prices reduce production motivation. The central bank might consider using monetary policy to stimulate the economic growth during low-

inflation environment. It means that an expansionary monetary policy can be used to increase the volume of bank loans to stimulate the economy.

There are various ways to classify risks. For instance, business risk can be categorized into: market risk, credit risk and operational risk. In banking operation, market risk includes interest rate risk, liquidity risk and foreign exchange rate risk.

On the other hand, risks can be classified into two types: systematic risk (such as market risk) and unsystematic risk. Systematic risk, known as market risk or volatility or undiversifiable risk, affects to the overall market. It cannot be avoided totally by diversification, but only by using asset allocation strategy. If you want to know the market risk, you can estimate beta (this study suggests 2 beta calculations: equity beta and asset beta, under debt leverage impact). Another example of systematic risk is interest rate risk which affects the whole market and the entire stocks.

Beta equals to 0: means the stock price uncorrelated to the market. Beta negative (less than 0): means the stock price go opposite to the market index. Beta equals to 1: means the portfolio moves in the same direction with the market and sensitive to market risk. Beta higher than ($>$) 1: means there are more volatility, the portfolio moves in the same direction with the market and very sensitive to market risk. Beta between 0 and 1: i.e less volatility and stock price moves in the same direction with market index. Beta is a popular measure of market risk which cannot be eliminated by diversification due to its nature, but it can be insurable. Investors can only reduce a portfolio's exposure to systematic risk by sacrificing expected returns.

On the contrary, unsystematic risk, known as diversifiable risk or nonsystematic risk or residual risk, is specific risk in each industry or firm or security. For instance, risk coming from competitors in the market and market share will affect our business and profit. This kind of risk might be reduced via diversification strategy. So it is also called controllable risk. Unsystematic risk normally happens due to internal factors (ex. Employees, industry regulation change, manipulation in financial statements...) which are associated with that business only and affect a single stock or segment.

Risk can also be divided into various groups: market risk (due to risk factors such as interest rate, foreign exchange or stock price), market liquidity risk (a real example is the real estate market in Vietnam during the financial crisis 2007-2009), funding liquidity risk (unexpected outflow of funds), credit risk, operational risk (such as processing risk, IT system risk, legal risk, Human resource risk, reputational risk, Information risk, tangible asset risk).

Financial and credit risk in the bank system can increase when the financial market becomes more active and bigger, esp. with more international linkage influence. Hence, central banks, commercial banks, electrical and computer firms and the government need to organize data to analyze and control these risks, including market risk.

For the hotel, entertainment and tourism industry, high inflation may harm the electric companies and cause higher losses and increase the operational costs. In case of low inflation, interest rates may fall and hence, it is not a benefit for investment portfolio. Hence, risk assessment and control mechanisms are necessary for them to reduce these losses.

3. Methodology and data

We use the data from the stock exchange market in Viet Nam (HOSE and HNX) during the post – low inflation time 2015-2017 to estimate systemic risk results. We perform both fundamental data analysis and financial techniques to calculate equity and asset beta values.

In this study, analytical research method and specially, comparative analysis method is used, combined with quantitative data analysis. Analytical data is from the situation of listed hotel, entertainment and tourism firms in VN stock exchange.

We use quantitative research method to collect, gather quantifiable data from stock market and analyze data with mathematical techniques of calculating equity beta var and asset beta var during the period 2015-2017. This sampling method helped us a lot with the available data from the live stock market in public domain. We choose quantitative method because it is objective and investigational in nature.

We select a sample of 26 listed firms in three (3) industries or groups of company: hotel, entertainment and tourism sectors. Then, estimating equity beta has been done by using the traditional covariance formula, and we estimate asset beta under the impact of leverage. We also make a comparison of equity and asset beta values in these three (3) industries, calculate and analyze the gap between groups. We choose cross-industrial survey and sampling in a condition that these 3 industries are linked together in a whole financial system. This is, in fact, a simple random sampling, but we also pay attention to selecting key players in each category of three industries. The sample size will reflect and represent for the target market.

Under our beta calculation and comparison, we can draw a picture of the whole market risk of Vietnam electrical and computer industries. Hence, we can answer research questions or issues on how much market risk in each company group increases or decreases, and later we can figure out the above hypothesis test is true or false. Then, the research results can be generalized for the whole market.

Last but not least, government macroeconomic data are also collected and presented in 4 Exhibits. This will helps us to see the macro picture of Vietnam economy during the post-low inflation environment and through a long time (10-year periods). Our quantitative data are shown by tables, charts, graphs to make it easy to understand. In summary, quantitative method is mainly used because it helps to collect data quickly, concisely with reliable and accurate data. When we conduct this research, the number presents the honest picture of research and accurate, as well as less time consuming. It, hence, eliminated biasing of results which are fair in this study. In data analysis section, we also combine interpreting the data results and descriptive analytical method.

Finally, we use the results to suggest policy for both these enterprises, relevant organizations and government.

4. Main results

4.1 General Data Analysis

We get some analytical results form the research sample with 12 listed firms in the airline & tourism market, 8 hotel firms and 8 entertainment companies with the live data from the stock exchange.

4.2 Empirical Research Findings and Discussion

In the below section, data used are from total 28 listed hotel, entertainment and tourism companies on VN stock exchange (HOSE and HNX mainly). Different groups are created and comparison of the calculation of risk data among 3 groups has been made.

Market risk (beta) under the impact of debt, includes: 1) equity beta; and 2) asset beta. We model our data analysis as in the below figure 1:

Post – low inflation period	Risk level (equity beta)	Risk level (asset beta)	Other measures	Gap
Entertainment group				
Hotel group	Scenario ...	Scenario ..	Scenario ..	Analysis
Airline & tourism group				

Figure 1. Analyzing market risk under two (2) scenarios: post – low inflation period 2015-2017 compared to the financial crisis 2007-2009

A. Airline & tourism industry during the post – low inflation environment (see table 1):

Table 1. The Volatility of Market Risk (beta) of airline and tourism industry in the post- low inflation environment 2015-2017

Order No.	Company stock code	2015-2017 (post - low inflation)		Financial leverage	Note
		Equity beta	Asset beta (assume debt beta = 0)		
1	CTC	-0.185	-0.065	64.6%	assume debt beta = 0; debt ratio as in F.S 2015; FL calculated as total debt/total capital
2	DLC				
3	DLV				
4	FDT	0.127	0.035	72.7%	
5	HOT	-0.704	-0.528	25.0%	
6	PDC	0.654	0.488	25.4%	
7	PGT	0.490	0.483	1.5%	
8	TCT	0.097	0.093	5.0%	
9	TTR				
10	MAS	0.220	0.000	48.8%	
11	HVN	0.020	0.003	86.4%	
12	VJC	0.113	0.020	82.2%	

The above table shows us there is no firm having beta higher than 1.

Table 2. The Statistics of Volatility of Market Risk (beta) of airline and tourism industry in the post- low inflation environment 2015-2017

Statistic results	2015-2017 (post - low inflation)	
	Equity beta	Asset beta (assume debt beta = 0)
MAX	0.654	0.488
MIN	-0.704	-0.528
MEAN	0.092	0.059
VAR	0.1509	0.0917
Note: Sample size : 12 (We just take a sample of 12 firms to make comparison)		

The gap between max and min values is 1.358, which means higher than that of hotel industry.

Both equity beta max value and equity beta mean value are lower than 1, which is acceptable in this industry.

Asset beta max, asset beta var and asset beta mean values have been decreasing, as shown in the above table. It shows us the debt leverage impact on reducing the risk level.

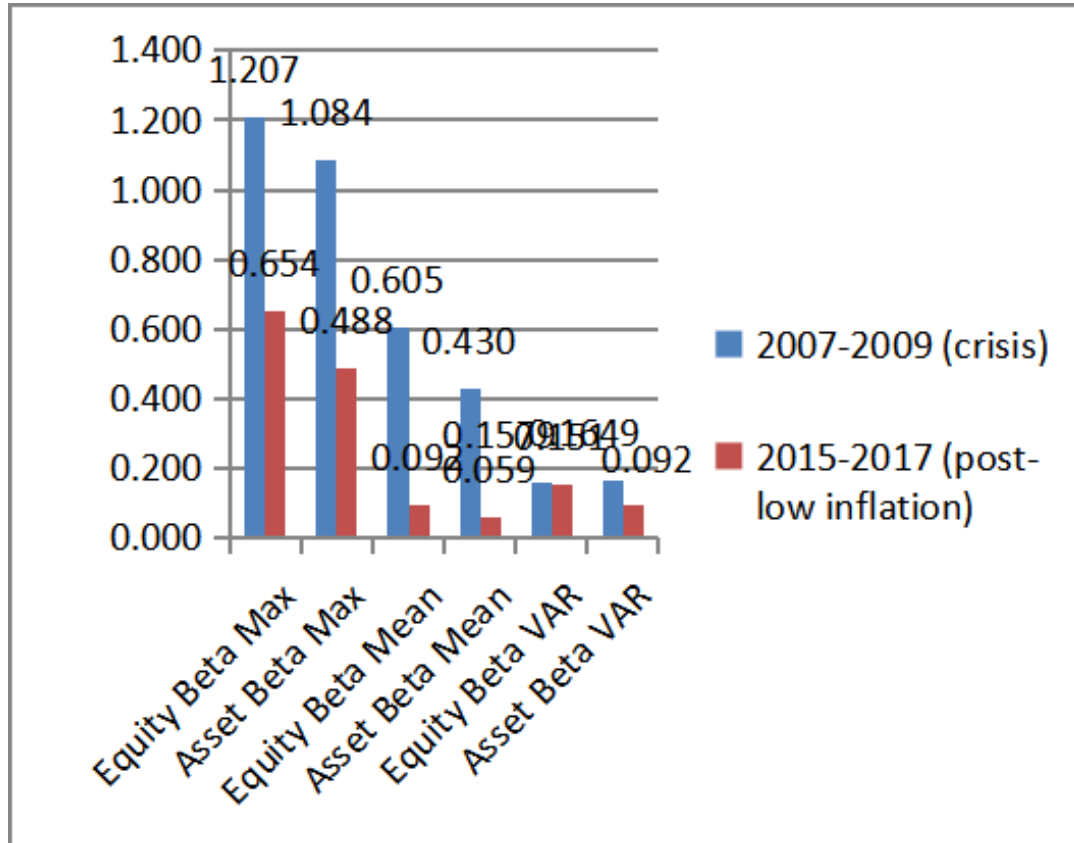


Chart 1. Statistics of Market risk (beta) in VN airline and tourism industry in the post – low inflation period 2015-2017 compared to the financial crisis 2007-2009

The above table1 shows us that there is no firm with beta values > 1 . And table 2 shows that beta mean values are acceptable < 1 .

We summarize the data in the above chart 1 as the analysis follows:

For the airline and tourism industry, different from hotel industry, the market risk volatility has been just slightly decreasing during the post-low inflation environment (2015-17) as shown by equity beta var in the above chart, whereas the risk level (equity and asset beta mean) decreased much. We also realize that there is a big gap between equity beta max in the crisis (1.207 and 1.084) compared to those in the post-L inflation time (0.654 and 0.488).

B. Hotel Industry during the post – low inflation environment:

Table 3. The Volatility of Market Risk (beta) of Hotel industry in the post- low inflation environment 2015-2017

Order No.	Company stock code	2015-2017 (post - low inflation)		Financial leverage	Note
		Equity beta	Asset beta (assume debt beta = 0)		
1	DLD	-0.111	-0.047	58.1%	assume debt beta = 0; debt ratio as in F.S 2015; FL calculated as total debt/total capital
2	DXL	-0.383	-0.128	66.7%	
3	MTC	0.016	0.015	5.9%	
4	OCH	-0.277	-0.106	61.9%	
5	SGH	-0.040	-0.027	33.5%	
6	VIR	-0.059	-0.055	7.4%	
7	VNG	-0.042	-0.018	55.8%	
8	DAH	0.004	0.001	70.0%	

The above table 3 shows us there is no company having beta higher than 1. And asset beta values have been decreased.

Table 4. The Statistics of Volatility of Market Risk (beta) of Hotel industry in the post- low inflation environment 2015-2017

Statistic results	2015-2017 (post - low inflation)	
	Equity beta	Asset beta (assume debt beta = 0)
MAX	0.016	0.015
MIN	-0.383	-0.128
MEAN	-0.112	-0.045
VAR	0.0204	0.0025
Note: Sample size : 8		

The gap between max and min values is 0.399, which means lower than that of tourism group. Both equity beta max and equity beta mean values are lower than 1, which is acceptable in this industry.

Also, asset beta var has been decreased considerably, as shown in the above table. It shows us the debt leverage impact on reducing the risk level.

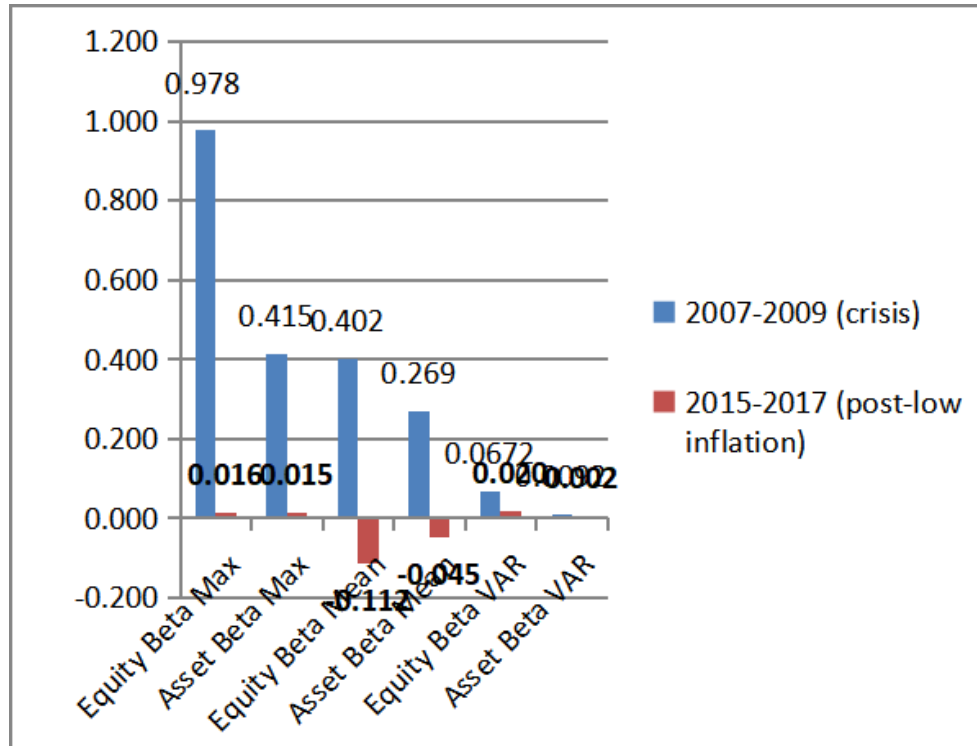


Chart 2. Statistics of Market risk (beta) in VN Hotel industry in the post – low inflation period 2015-2017 compared to the financial crisis 2007-2009

The above table 3 shows us that there is no firm with beta values > 1 . And table 4 shows that beta mean values are small and negative.

We summarize the data in the above chart as the analysis follows:

For the hotel industry, the market risk level has been reduced during the post-low inflation environment (2015-17) as shown in the above chart, while the risk fluctuation has decreased much (equity and asset beta var). We also realize that there is a big gap between equity beta max in the crisis (0.978 and 0.415) compared to those in the post-L inflation time (0.015 and 0.015).

Entertainment Industry during the post – low inflation environment:

Table 5. The Volatility of Market Risk (beta) of Entertainment Industry in the post- low inflation environment 2015-2017
(Source: Vietnam stock exchange. Note: N/A: data of listed firm not available)

Order No.	Company stock code	2015-2017 (post - low inflation)			Note
		Equity beta	Asset beta (assume debt beta = 0)	Financial leverage	
1	DNT	0.220	0.169	23.3%	assume debt beta = 0; debt ratio as in F.S 2015; FL calculated as total debt/total capital
2	DSN	0.014	0.014	4.5%	
3	GTT	-0.099	0.015	115.6%	
4	RIC	0.490	0.384	21.6%	
5	VPL	N/A	N/A	N/A	
6	HES	0.013	0.011	12.5%	
7	VEF	0.486	0.482	0.9%	
8	BTV	0.011	0.009	24.0%	

The above table shows us there is only 1 company having negative beta. And asset beta values have been decreased.

Table 6. The Statistics of Volatility of Market Risk (beta) of Entertainment Industry in the post- low inflation environment 2015-2017

Statistic results	2015-2017 (post - low inflation)	
	Equity beta	Asset beta (assume debt beta = 0)
MAX	0.490	0.482
MIN	-0.099	0.009
MEAN	0.162	0.155
VAR	0.0585	0.0402
Note: Sample size : 8		

The gap between max and min values is 0.589, which means lower than that of tourism industry. We also see equity beta max value and equity beta mean value < 1: It is acceptable in this industry. Asset beta max, asset beta var and asset beta mean values have been decreased considerably, as shown in the above table 5. It shows us the debt leverage impact on reducing the risk level.

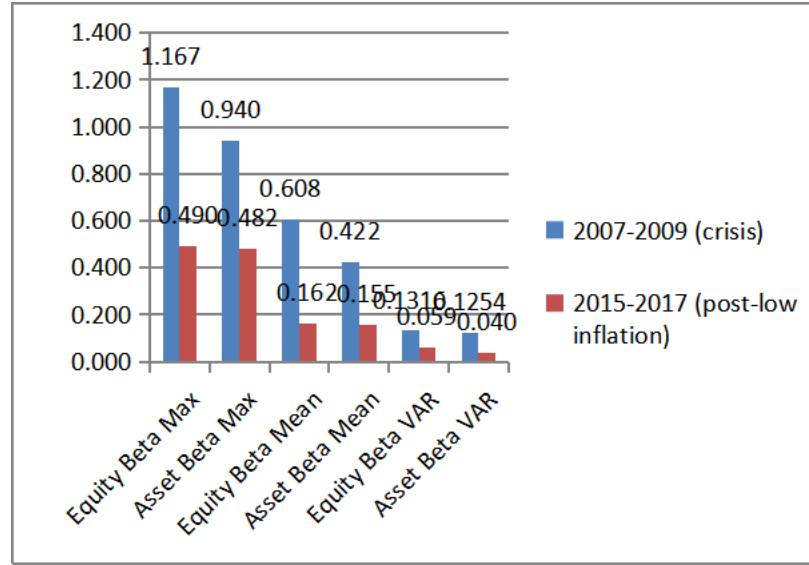


Chart 3. Statistics of Market risk (beta) in VN Entertainment industry in the post – low inflation period 2015-2017 compared to the financial crisis 2007-2009

The above table 5 shows us that there is no firm with beta values > 1 . And table 6 shows that beta mean values are acceptable < 1 . We summarize the data in the above chart 3 as the analysis follows:

For the entertainment industry, different from hotel industry, the market risk level has been decreasing during the post-low (L) inflation environment (2015-17) as shown by equity beta mean in the above chart, while the risk fluctuation has been reduced (equity beta var). We also realize that there is a big gap between equity beta max in the crisis (1.167 and 0.94) compared to those in the post-L inflation time (0.49 and 0.482). Comparison of three (3) industries: Hotel, entertainment, airline & tourism (in Chart 4)

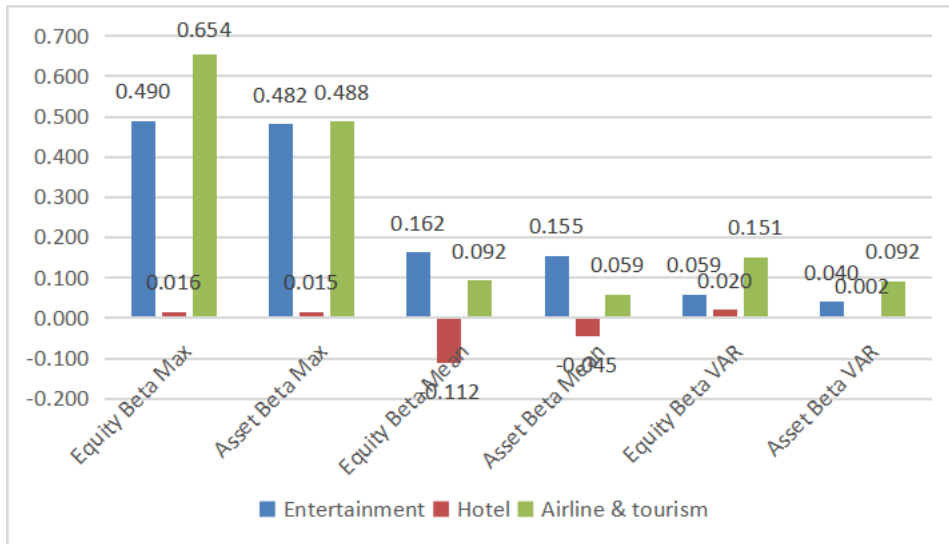


Chart 4. Statistics of Market risk (beta) in 3 industries in the post – low inflation period 2015-2017: Hotel, entertainment, airline & tourism industry group

Based on the above calculation result table, we analyze data as follows:

Firstly, the above chart tells us value of equity beta mean in the airline & tourism and hotel industries are lower than that of entertainment industry, which means lower risk level.

Then, shown by equity beta var, risk volatility in the hotel industry is the lowest, while that in airline & tourism industry is the highest.

4. Risk analysis

Inflation can affect negatively on market capitalization, but low inflation could be beneficial to economic recovery and might have benefits for financial system as investors can perform more transactions. However, Vietnam inflation rate in 2015 is at a low level, still acceptable, in the context that global economies in many developed countries also reached low rate.

Furthermore, when the Vietnam financial system has been becoming more active and bigger in size, there will be potential risk, esp. in the context of the global impact from international financial markets became bigger.

There are several factors affecting market risk level and fluctuation including, but not limited to: the entire financial market instability of global financial or economic crisis or catastrophic events can cause market risk, or fluctuations and volatility interest rates, foreign exchange rate or stock price.

5. Discussion for further researches

We can continue to analyze risk factors behind the risk scene (risk increasing as above analysis) in order to recommend suitable policies and plans to control market risk better. Also, the role of risk management and risk managers need to be developed more.

Specifically, Vietnam stock market has been established and developed since 2005-2006 until now, it has gained a lot of operational experiences with many newly-established companies, and some bankruptcies as well. Our analysis stated the risk level of Hotel, entertainment, airline & tourism group has been decreasing, but risk management tools always needed to enhance to prevent losses happened as it was in the financial crisis 2007-2009.

Vietnam Hotel, entertainment, airline & tourism companies can reduce risk by using reinsurance contracts and improve risk management practices, or perform good contract appraisal, or improving customer service to receive, evaluate customer awareness and client feedback to have proper plans to reduce customer complaints.

For all three (3) financial industries: Hotel, entertainment, airline & tourism companies, in order to reduce risk, they all need to enhance corporate governance structure, mechanisms and standards. Vietnam Hotel, entertainment, airline & tourism firms, as well as in other developing and developed countries, need to adapt to international corporate governance standards which are standardized and recommended by many international organizations such as ADB, OECD, IFC, WB, ECODA, CFA.... In addition to, these financial service firms also pay attention to technology, process and esp., to people or human resources in order to train them about risk management tools and practices to reduce business risk. Establish risk management team will help to manage all market risk, credit risk and operational risk. This risk management team, with management accountability and with experienced supervisory board, will bring together risk management model assessment, technology expertise and regulatory experience. To put in another word, the need of risk management and corporate governance has been increasing since the financial crisis 2007-2009. The roles of risk team and roles of compliance officer, internal control (self-control) and audit committee need to be clarify more in management system. Even in some specific cases, some companies might consider hiring a third-party firm (for example, law firm) to perform risk

management activities. Not only Hotel, entertainment, airline & tourism firms take care of operational risks and technology-driven change and higher competition level, but also they manage financial risks. The fundamental step is to quantify market risk or financial risks with a risk management model which is cost-effective and analyzes or involves risk factors. Therefore, it is necessary to consider and evaluate both benefits and drawback of implementing cost saving risk functions. Another thing to consider is the biases happening and affecting the decision making process in many Hotel, entertainment, airline & tourism companies; hence, we need to reduce bias when making decision by using debate techniques to recognize them and then, eliminate biases to achieve a fair and true decision. For better and transparent processes to eliminate financial risks, Hotel, entertainment, airline & tourism firms also take care of implementing ISO 9001 standards to build up their operational processes for all functions and departments. Financial risk could be considered as one of core arts of strategic planning.

Market risk or systematic risk can be insurable or reduce through hedging techniques. The meaning of hedging just similar to insurance, i.e hedge and reduce losses when an unexpected event or bad scenario in future happens. For instance, investors might buy and use options to hedge risk, or reduce risk of a stock or portfolio when the price of the underlying asset goes down. Another method to avoid market risk is choosing modern portfolio theory to identify investor risk tolerance and then build an optimal portfolio by using statistical measures to examine the correlation between assets, between risk and returns. Using statistical techniques and software constructs an efficient frontier which shows a linear relationship between risk and return. Portfolio managers and investors and firms might consider using hedging techniques to manage and reduce their exposure to risk. Hedging, known as using financial instruments or derivatives such as options and future, helps you to reduce losses, rather than making money and you have to pay premium or cost of hedging (this is the price of hedging). Our discussion on risk factors, risk management framework, and risk management model here might be applied and might be true for several developing countries in which central bank and bank system play a major role and leading role in corporate restructuring, and with the young, newly established and active stock market. For investment strategy, it depends on risk attitude of each investor when they choose a portfolio based on risk level measured by beta values. For instance, risk-adverse investors may prefer stocks with beta less than 1 so that they will reduce losses when the market declines sharply. On the other hand, risk takers might prefer stocks with higher beta which aim for higher profits.

As we can see from Exhibit 1, the risk management plan and scheme need to be put in the context that Vietnam economy has controlled inflation well in many years (4-5%), and achieved good GDP growth rate (see Exhibit 2) annually more than 5%. Also, in the whole picture of the local economy, loan growth rate also slightly decreases and has been controlled at rate of about 16% (see exhibit 3) whereas the lending rate tends to reduce and the gap between deposit rates and borrowing rates also have been shorten since 2017.

6. Conclusion and policy suggestion

In general, Hotel, entertainment, airline & tourism companies system in Vietnam have been contributing significantly to the economic development and GDP growth rate of more than 6-7% in recent years (see Exhibit 2). The above analysis shows us that most of risk measures (equity beta max, mean and var) are decreasing under leverage impact during the post-low inflation period. However, these 3 groups of companies in Vietnam need to continue increase their corporate governance system, structure and mechanisms, as well as their competitive advantage to control risk better. For instance, Hotel, entertainment, airline & tourism system might consider proper measures and plans to manage bad scenarios in future. Another way is increasing productivity while reducing management or operational costs. It is the time for our Hotel, entertainment, airline & tourism companies to set a private budget for risk management practices and risk management team, not only foresee the risk and opportunity to capitalize on. In many big corporations, they organize not only ALM committee and audit committee but also risk management committee (might cover and have a linkage with Human resource, IT, Legal, compliance and Public relation departments) in their corporate governance structure to foresee, access and manage market risk, credit risk and operational risk. They also need to clearly define responsibilities, tasks and roles between divisions,

code of conduct and ethical guidelines, set clear reporting lines and control measures and head quarter, group and branch levels. We can continue to expand risk governance discussion in Hotel, entertainment, airline & tourism sector in order to standardize risk management framework and build up organization characteristics.

This research paper provides evidence that the market risk potential has decreased under the impact of debt leverage in 2015-2017 post-low inflation period (looking again chart 1 – equity and asset beta mean values), while the Exhibit 3 also suggests that the credit growth rate increased in 2016 and slightly decrease in later years (2017-2018). It means that the local economy is trying to control credit growth reasonably and logically, however we need to analyze risk factors more carefully to reduce more market risk. Additionally, central banks and other governmental bodies also need to evaluate good impact of debt leverage and continue to issue suitable credit programs rationally and loan packages to various economic sectors to both stimulate the economic growth and reduce market risk.

This research paper generates quantitative results on market risk in order to give warning for specific industry in case there is any high increase in market risk level and volatility. From this, Hotel, entertainment, airline & tourism companies might continue to measure and control risk level more rationally and better. They can build their own risk management model to evaluate and measure market risk and other risks periodically, annually. Good risk management involves the meanings of identifying, assessing and mitigating risk.

Last but not least, as it generates the result that the risk level became lower under the leverage impact in the post-low inflation period, the government and relevant bodies such as Ministry of Finance and State Bank of Vietnam need to consider proper financial policies (including a combination of fiscal, monetary, exchange rate and price control policies) aiming to reduce/control the risk better and hence, help the stock market, 3 above groups as well as the whole economy become more stable in next development stage. For these firms, they need policies to encourage SMEs development and capital to participate in global supply chain.

The global financial crisis has passed since 2007-2009, but several corporate scandals and bankruptcies still left lessons for failures in risk management and corporate governance framework and structure of financial institutions and corporations. It is the time for our Hotel, entertainment, airline & tourism firms to enhance standards and mechanisms as well as new perspectives in management, corporate governance and leadership. Tourism and hotel industries in Vietnam need to invest and develop in depth, not in width, and with safety and environment protection.

Finally, this study opens some new directions for further researches in risk control policies in Hotel, entertainment, airline & tourism system as well as in the whole economy. For instance, how increasing inflation and deflation affects the risk level of Hotel, entertainment, airline & tourism industry and how much inflation is sufficient for financial system and economic development.

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Exhibits

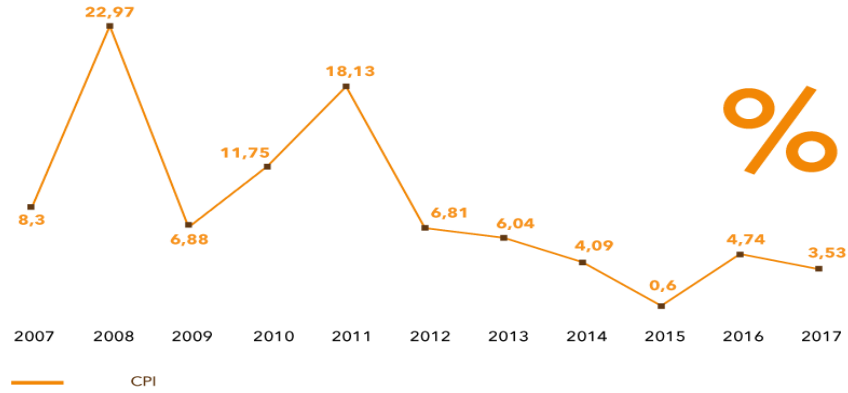


Exhibit 1. Inflation, CPI over past 10 years (2007-2017) in Vietnam

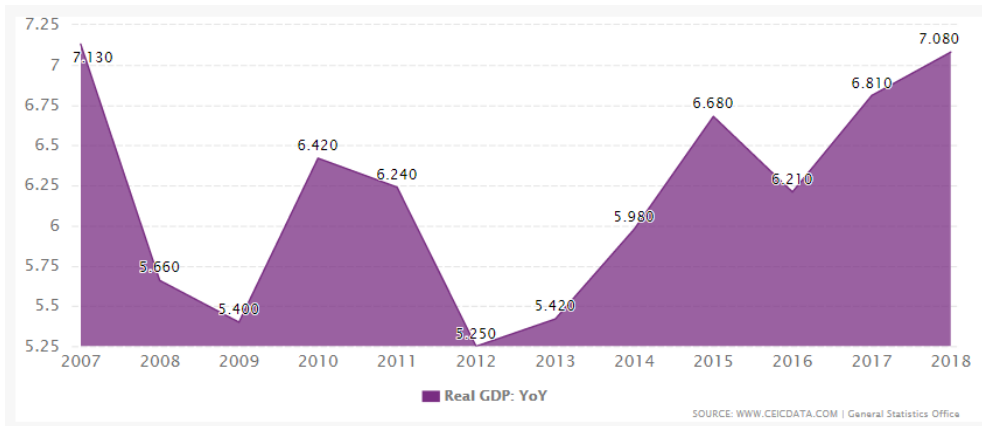


Exhibit 2. GDP growth rate past 10 years (2007-2018) in Vietnam

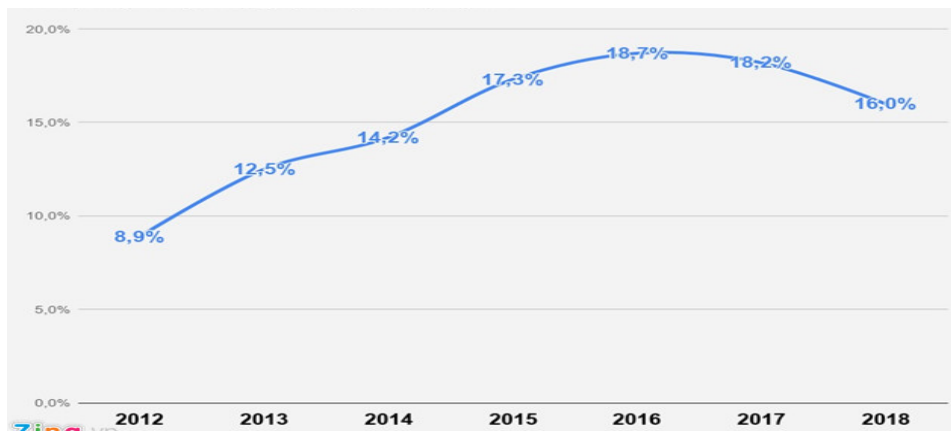


Exhibit 3. Loan/Credit growth rate in the past years (2012-2018) in Vietnam

Source: <https://www.ceicdata.com/en/indicator/vietnam/real-gdp-growth>

Dinh Tran Ngoc HUY, MBA is the Visiting Finance lecturer, MBA '07, Banking University Ho Chi Minh city Viet Nam – GSIM, International University of Japan, Niigata Japan.

ORCID: <https://orcid.org/0000-0002-2358-0699>

Do Hong NHUNG, Dr. works at The National Economics Univeristy (NEU) Ha Noi, Vietnam.

ORCID: <https://orcid.org/0000-0002-6459-0869>

Tran Thi Bich HANG, Dr. works at Faculty of Hospitality-Tourism, Thuong Mai University, Ha Noi, Vietnam

ORCID: <https://orcid.org/0000-0002-6411-1880>

Duong Thi Hong NHUNG, MBA is currently working at Faculty of Hospitality-Tourism, Thuong Mai University, Ha Noi, Vietnam

ORCID: <https://orcid.org/0000-0003-4404-9896>

Nguyen Manh Hung, Dr. is working at Thuong Mai University, Ha Noi, Vietnam

ORCID: <https://orcid.org/0000-0002-2460-6205>

Pham Minh DAT is the lecturer, PhD, working at ThuongMai University Ha Noi Vietnam

ORCID: <https://orcid.org/0000-0002-7262-4299>

Register for an ORCID ID:

<https://orcid.org/register>

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KNOWLEDGE AUDIT AS A KEY TOOL FOR BUSINESS RESEARCH IN THE INFORMATION SOCIETY

Liudmila V. Kashirskaya ^{*1}, Alexey A. Sitnov ², Dilmurod Ash. Davlatzoda ³, Tatiana M. Vorozheykina ⁴

¹Financial University under the Government of the Russian Federation, Leningradsky Prospekt, 49, 125993, Moscow, Russian Federation

²Financial University under the Government of the Russian Federation, Leningradsky Prospekt, 49, 125993, Moscow, Russian Federation

³Tajik National University 35, Ayni Ave 734025, Dushanbe, Republic of Tajikistan

⁴Russian State Agrarian University - Moscow Agricultural Academy named after K.A. Timiryazev, 127550 Timiryazevskaya st., 49, Moscow, Russian Federation

E-mails: ^{*2}kashirskaya76@mail.ru

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Abstract. The article discusses and systematizes the possibilities of knowledge audit in the frames of the formation of the information society. The features of developing a methodology, organization and knowledge audit tools that meet the modern needs of the development of business audit are assessed. The problem of modern times also lies in the fact that the audit of explicit (formalized) knowledge is fundamentally different from the audit of implicit (non-formalized) knowledge. As one of the main areas of business audit, knowledge audit is highly professional consulting services in a wide range of subject areas of economic, financial, legal and many other areas of modern business. A research of the demand for this area of audit in the global community showed that the lack of an agreed methodology prevents from making the decision about conducting an audit of knowledge. The article examines modern approaches that allow combining the capabilities of modern business audit in general and information systems audit, operational audit, intellectual capital audit and knowledge audit, in particular. It is concluded that combining these types of audits into a single audit of a business shows a significant business effect. The practical significance of the article lies in the fact that conclusions and suggestions aimed at strengthening the role of modern audit contribute to the real optimization of modern business. A research made by the authors showed that the new reality of the 21st century has changed the attitude towards traditional audit, which requires justification of the business effect when introducing new information systems and modernizing old ones, moving from complex automation of business processes to specialized solutions. Notwithstanding with it, the demand for business development and IT strategies and feasibility studies is growing steadily. Projects on the use of corporate knowledge at all levels of management come to the fore.

Keywords: knowledge audit; corporate memory; knowledge management system; explicit (formalized) knowledge; implicit (non-formalized) knowledge; reengineering; optimization; intellectual capital; intellectual potential; intangible assets; knowledge assets

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JEL Classifications: M 41, M 42, M 49, G22.

1. Introduction

In the frames of modern global changes, accompanied by continuous technological changes, which are being carried out at a very rapid pace, a need of quick search for appropriate and relevant information on an unprecedented scale arises almost simultaneously with the appearance of this information in the information space surrounding these systems. The business seeks to improve and strengthen its capabilities by strengthening the emphasis on a modern and progressive management methodology, the so-called knowledge management methodology.

At the same time, knowledge in this context is understood as a combination of data and information, including various combinations of new technologies, production experience, emotions, culture, values of indicators, ideas, intuition, motivation, styles of learning, attitudes, ability to trust and solve complex problem situations, frankness, the ability to work in a modern information network, sociability, attitude to permanent risk, the presence of an entrepreneurial spirit (Kashirskaya et al., 2019; Saenko et al., 2019; Voronkova et al., 2019).

In the general understanding, knowledge management is a set of conceptual apparatus, subject disciplines and tools for organizing knowledge that allow managers to take responsibility for corporate knowledge and, based on this corporate knowledge, effective management decisions.

The tendency of managers to use knowledge leads to the accumulation of particularly valuable assets, improves their ability to make and use in practice effective rather than traditionally rational management decisions.

According to J. Gardner, one of the famous modern researchers of management problems, the only possible stability of the existence of business is “the stability in motion”. And since the movement is generated by contradictions, their resolution consists in the search for “dynamic balance” between the stability of the business system and its continuous improvement, that is, in the search for new effective management decisions, as outdated stereotypes become unacceptable for this subject (Gardner, 1981).

The concept of “management decision” is usually considered from three points of view. Firstly, it denotes a process of a certain sequence of management actions aimed at choosing the optimal path for the activity of this subject. Secondly, it is the process of choosing an option to solve a particular problem or task. A problem is a complex theoretical or practical aspect that requires study and resolution. Usually “a problem means a mismatch between the desired (normative) and actual levels of achieving goals” (Golubkov, 2005, p. 45). And, finally, thirdly, it is a specific managerial action (Trofimova et al., 2019; Luzina et al., 2019; Suryono et al., 2019; Prodanova et al., 2019).

Any control process is a definite and continuous in time sequence of actions, combined into appropriate stages according to the quality content and uniformity of those operations that are necessary for their implementation. The making of managerial decisions, as mentioned earlier, is preceded by a study of the current situation and the choice of options for these decisions related to a particular problem. Therefore, a situation is understood as “a combination of conditions and circumstances in which a problem arose” (Golubkov, 2005, p. 45). Ideally, it is desirable to have all possible options of action that could eliminate the causes of the problematic disturbances and, thus, provide the business with the opportunity to achieve the stated goals. Identification and description of a problem situation provides an initial information base for evaluating the time available for making a decision and the amount of resources needed for this. However, in practice, managers most often do not have sufficient relevant information and, moreover, time to identify and evaluate each alternative solution. At the same time, a significant number of alternative solutions are more likely to interfere than to help management. Therefore, as a rule, managers are limited to a small number of options for those decisions that correspond only to a certain

minimum requirement established by the business itself. However, the best decision is considered to be the one that is most often called optimal in economic literature. At the same time, under conditions of constant uncertainty, it is not always possible to find the optimal and at the same time strictly formalized solution (Golubkov, 2005).

Famous scientists in the field of control theory M.K. Meskon, M. Albert and F. Hedouri believe that in the case when managers "... are not able to assess what will happen if nothing is done, there is a danger not to resist the demand for immediate action. Action for the sake of action increases the probability of responding to an external symptom of a problem, rather than its main cause" (Meskon, 2002, p. 205).

In his turn, G. Simon argues that, when solving a particular problem, business usually is incined to behavior that cannot be called as optimization of managerial decisions. In this case, the optimal management solution is not used at all because of the lack of time and the inability to take into account all relevant information and a significant number of possible options for such a solution. In this situation, managers may take inappropriate actions that are subjectively acceptable, but not always the best of all possible (Simon, 1995).

In practice, knowledge is divided into explicit (formalized), expressed in objects, words, numbers, graphic forms, drawings, specifications, textbooks, procedures, and implicit (unformalized), which are theoretical models, models of behavior and perspectives based on empirical data and experience of the carriers of this knowledge themselves (Kashirskaya et al., 2019; Lafer and Tarman, 2019; Nonaka and Takeuchi, 1995; Sharafutdinov et al., 2019; Neizvestnaya et al., 2018; Akhmetshin et al., 2018).

However, up to nowadays, all efforts aimed at creating modern systems of knowledge management in business are reduced, as a rule, only to the promotion of individual information technologies related to the introduction of modern software products that allow solving only certain aspects of this problem. In a number of cases, in the most developed business, these technologies are combined into a single information system for a business at various levels of its development (Korableva et al., 2018).

In the era of modern and very intense changes in the 21st century, traditional approaches to management, which guarantee business success for a long time, cannot stop the gradual decline of its resistance to both internal contradictions and external threats from a very aggressive and sometimes very unpredictable competitive environment. A static, non-developing, corporate memory that serves as the basis for making managerial decisions becomes an increasingly distorted view of the future for business, and the rules and procedures established in business begin to lose their significance over time (Gibbert et al., 2002).

Corporate memory in this context is an implicit or explicit interpretation of business processes or manufactured products, goods or services that does not subject to business. It should be borne in mind that "companies, like people, remember the past, including old processes and procedures, as well as corporate traditions and values." (Kouloupoulos and Frappaolo, 1999, p. 114).

Being in a similar situation, managers often initiate radical transformations based on reengineering, rebuilding their business and IT processes and, what is most important, business strategies under new business conditions, modern challenges, and threats, while destroying the established internal knowledge potential of their business systems. Thus, in the process of such business transformations, managers make a huge mistake, replacing the outdated (in their opinion) corporate memory with new knowledge at that moment and practically stop there. At the same time, there is a desire to withdraw the most experienced knowledge carriers from business and replace them with younger, but less competent employees.

Researches of scientists and modern practice have proved that a fixed in time view of a problem situation is typical for reengineering. The reason for this lies in the inability to take into account the characteristic features of modern markets, continuously progressing, and very rapid changes occurring in a competitive environment (Koulopoulos and Frappaolo, 1999, p. 114).

Thus, the knowledge acquired by the business as a result of reengineering also very soon becomes obsolete. An urgent need for a repeated and at the same time very costly transformation of the business model arises. According to the opinion of the famous scientists and practitioners Thomas M. Culopoulos and Karl Frappaolo and with which one cannot disagree, the strength of modern business of the 21st century is not in the knowledge that was used in the past and is outdated, "... but in the ability to constantly update the corporate wisdom repository and use its contents for new purposes" (Koulopoulos and Frappaolo, 1999, p. 12). However, an approach based on reengineering does not allow this process to be carried out continuously and requires more and more costs for new transformations (Nagimzhanova et al., 2019; Magsumov, 2017; Yemelyanov et al., 2018). Unlike reengineering, knowledge management defines a constant readiness of a business for managerial influences, contributes to continuous transformation and innovation at a speed that at least corresponds to the pace of the modern development of a competitive environment.

In modern conditions, changes are, of course, inevitable and continuous, therefore, innovative processes must be constant and continuous. The information base for this is precisely the repository of corporate wisdom. In order to remain successful and sustainable in today's constantly changing competitive environment, it is necessary to continuously accumulate knowledge and expand it in accordance with the needs of the future market, transforming corporate memory into corporate wisdom (Koulopoulos and Frappaolo, 1999, p. 116).

Thus, a new, intangible, form of resources appears in business - intellectual capital. At the same time, scientists and practitioners in the field of management have recently used the concept of "intellectual potential" of a business (Novgorodov, 2017; Nigamaev et al., 2018; Kopteva et al., 2019; Prakash and Garg, 2019).

Mentioned objects almost always existed in business, but they were identified relatively recently as a resource or an asset. Intellectual capital can be defined as the set of all the knowledge of employees of an individual business, ensuring its resistance to permanent challenges from the competitive environment (Makarov, 2005), or as the set of intangible assets of an individual business that can be used to create value for a consumer result (Nayanova, 2001).

In its turn, the "intellectual potential" is a stock of knowledge, abilities, skills, culture and morality, health, capable of capitalizing under certain conditions. Moreover, it does not have age limits and health restrictions (Kotyrlo, 2011).

The definition of knowledge as business assets and, accordingly, the existence of the need to manage this type of asset are discussed in the works of scientists-economists as well as management practitioners (Kashirskaya et al., 2019). Intellectual capital determines the competitiveness of the business in the information society and therefore becomes one of the key resources. In its turn, the intellectual potential is not a capitalized element of the development of society (Akhmadeev et al., 2019; Smolnikova et al., 2019).

The well-known scientist in the specified subject field Thomas Stewart defines the intellectual capital as all business knowledge that can be considered an asset and distinguishes three main elements in its structure - human, structural and consumer capital. At the same time, human capital, in his opinion, represents the knowledge, skills and creative potential of business employees. In addition, here he also relates the culture of interpersonal relations. Structural (organizational) capital include patents, licenses, trademarks, brands belonging to a particular business, as well as hardware and software, organizational structure and methods of organizing

business and IT processes. Consumer (client) capital is an information base about the clients of a particular business, including the evolution of relationships with them, as well as relationships (Stewart, 2001).

In his turn, Karl-Eric Sveiby proposed his approach to the consideration of the elements of intellectual capital. In his opinion, it is necessary to single out the competence of employees, internal and external structures (Sveiby, 2004).

Moreover, under the competence of employees, a scientist means their abilities, including their education, qualifications, experience, attitude to their functions and to the business in which they work. This element of intellectual capital depends on specific employees, and if they leave the business, the competence leaves with them. At the same time, the internal structure is nothing more than intangible assets belonging to a particular business, enabling it to satisfy customer preferences of customers. It relates to the internal structure business strategy, patents, know-how, information systems, information databases, organizational structure and documented business and IT processes.

And finally, the external structure, in his opinion, shows the relationship of among business and contractors. External structure includes brands, trademarks, image belonging to a particular business.

At the same time, it should be mentioned that these scientists do not quite unambiguously correlate the objects of intellectual capital to one or another of its elements. For example, Karl-Eric Sveiby defines the attitude to work to the competence of employees, but at the same time, attitude to work is also considered as part of the corporate culture of the business. Moreover, he relates the latter to the internal structure (Sveiby, 2004). Such approach inherently complicates the practical use of these theories for the formation and application of knowledge management systems. At the same time, these approaches to determining the elements of intellectual capital can be applied to assess its state in a particular business and can be used as a starting point in the development of a business strategy and management policy, as well as its development (Thalassinos, I.E. and Thalassinos, Y., 2018; Hilkevics and Semakina, 2019). By choosing one of the above as a working model, it is possible in the context of a single business to develop a classification of intellectual capital objects with a view to subsequently controlling them and developing ways to develop intellectual capital management on its basis.

In the economy of the 21st century, the list of business systems whose success depends on the proper attitude to their knowledge is expanding rapidly. In large business, separate structural units are created and engaged in the development of a new consumer result (product, good or service), its introduction to the market, market research of its own consumer result, sale of high-tech products, and management of relations with contractors. The knowledge of the employees of these structural units of the business is of great importance for the entire business. The creating of modern effective knowledge management systems allows the specified business to solve the problems of distributing the knowledge system between the interested structural units of the business, as well as among its regionally separated employees who perform their functions in its geographical segments (Kotyrlo E. S., 2011).

In the context of the development of the information age, taking into account the needs of market participants, preventive consistent and at the same time independent control of the entire set of knowledge is necessary, focusing attention not only on the past, but also on the present and especially on the future of the controlled business, while erasing the boundaries between directly controlling functions and management consulting.

2. Methods

In the opinion of well-known foreign scientists and practitioners, and with whom one cannot disagree, the most acceptable tool for highly professionally implementing these functions in their entirety is a modern audit, but not a traditional audit of financial statements, but an audit of the business as a whole. It is a business audit that should include, as a separate area of audit, a knowledge audit (Kashirskaya et al., 2019).

At the same time, in this context, an audit of knowledge should be understood as a systematic independent scientific audit of corporate knowledge, both past and present, and especially future (corporate memory and corporate wisdom) and the development of management recommendations for business management based on its results.

According to Anne Hilton, a knowledge audit specialist, only 15% of knowledge management developments are completed with appropriate results (Andrusenko, 2007). At the same time, the main reason for failures when introducing these systems into the business is the lack of a preliminary audit of corporate implicit (non-formalized) knowledge (Vyatkina and Sitnov, 2018; Korchevenkov and Aleksandrova, 2018).

In addition, the lack of a coherent methodology for auditing a business as a whole does not allow them to determine appropriate approaches to identifying implicit (unformalized) knowledge necessary for a particular business both in the current time and, which is especially important, in modern conditions of a rapidly changing competitive environment, and especially in a strategic perspective.

Thus, auditors are not able to prepare specific and appropriate management recommendations for the management of this knowledge for any modern business.

At the same time, it can be confidently stated that the audit of implicit (non-formalized) knowledge at the present stage of development of a business audit as a whole is a very complex and time-consuming scientific audit study, requiring high professionalism and competence from the auditors themselves. At the same time, it is necessary to understand that the goals in each specific audit assignment may be different, and their achievement in the audit study of implicit (non-formalized) business knowledge is ambiguous.

According to scientists and experts in the field of auditing, it is advisable to make an audit of this knowledge in the following cases:

- during developing a business strategy in the field of knowledge management;
- if there are significant difficulties in finding the necessary information or a competent specialist expert in a particular subject area;
- if there is duplication of the collection of information and implicit (non-formalized) knowledge;
- in case of doubt about the value of an initiative related to the use of an information system, investment in certain software products or business projects;
- during relatively low efficiency of implementation of the results of scientific research and experimental development (R&D);
- during the reorganization of a business, its merger or acquisition (Kashirskaya et al., 2019).

In the course of the specified direction of the audit as part of a business audit, the auditor may:

- determine the organizational aspects and the readiness of the business for non-traditional transformations;
- develop management recommendations for the development of an adequate competitive environment requirements, a business strategy in the field of knowledge management, creation or development of the existing knowledge management system;
- identify hidden reserves of implicit (unformalized) knowledge for their further effective use by the management of the business under study;

- determine the structure of the intellectual capital of the business and establish the most effective methods and procedures for its evaluation;
- identify and assess the likely loss of knowledge due to the departure of their carriers from the business;
- establish the potential for creating in business groups of the most competent practicing employees who create this or that knowledge;
- systematize the identified knowledge assets and develop for management an appropriate methodology for their assessment.

At the same time, it should be mentioned that conducting an audit of knowledge requires the implementation of a significant amount of work to create the proper conditions for the preparation of an information base. At the same time, the fundamental target setting is the formation among managers and knowledge carriers of the studied business of an appropriate understanding of its importance for increasing the effectiveness of the knowledge management system.

It should be borne in mind that an important component of the audit of implicit (non-formalized) knowledge, as noted earlier, is the individuality and atypicality of each business under study, its business strategies, as well as the need for direct close cooperation with its knowledge holders and the involvement of various subject matter experts areas.

Thus, at the planning stage, it is necessary first of all to assess the status of the existing business knowledge management system. For this purpose, according to a number of scientists and practitioners, as well as the studies conducted, we can consider that the most appropriate is the use of the Capability Maturity Model proposed by the Software Engineering Institute by the US Department of Defense to classify and evaluate projects related to software development and quality assurance during the implementation of these projects (Sitnov and Urintsov, 2014; Ibbs and Kwak, 1997).

Assessment of implicit (non-formalized) knowledge by an auditor based on Maturity Models can serve as a qualitative component in the development of management recommendations for the practical implementation of the current and strategic management of the knowledge management system as a whole and its components in particular (Sitnov and Urintsov, 2014). Moreover, compliance with one or another level of the Model allows to determine the readiness of a business for modernization or updating. These Models allow the auditor to determine audit procedures that allow giving answers to what needs should be done during the audit on the essence of the audit engagement, as well as to establish the state in which the business knowledge management system is located.

In this study, the auditor must take into account that the first level of maturity corresponds to a situation when there are no formally accepted procedures for knowledge management in general in business and, as a result, which is especially important, implicit (unformalized) management plans, plans for its implementation are not created, work is poorly defined in content, volume and cost. Knowledge management processes are completely unpredictable and poorly controlled, and managers often do not understand key management issues. As a result, the success of the knowledge management system depends more on the individual efforts of knowledge holders than on the organization of management processes. A business at this level can be described as trying to spontaneously master the basic processes of knowledge management.

The second level of maturity (or as it is often called the “level of individual planning”) corresponds to the use of separate informal and incomplete knowledge management procedures in an organization. Managers partially apply and control management processes. However, in each case, planning and management depends on the individual approach of a manager.

The third level of maturity (management level) involves a partial formalization of knowledge management processes and the use of a basic planning and management system in business. A business that has reached this

level takes a systematic and structured approach to planning and control. The staff is trained to apply the methodology and tools of knowledge management.

The fourth maturity level (integration level) is characterized by full formalization with the official approval of all knowledge management processes and documentation (mapping) of relevant information. A business that has reached this level is able to effectively plan, manage and control the entire set of business processes they perform. Knowledge management processes are well defined, quantified, understood by staff and put into practice. Process related data is standardized, collected and stored in a database to ensure effective and objective analysis and quantification of processes, as well as to predict undesirable trends and prevent possible adverse situations. This allows the business to create the foundation for making effective management decisions.

And finally, at the highest, fifth level of maturity (level of improvement), knowledge management processes in business are constantly being improved. Automatic collection of both explicit (formalized) and implicit (unformalized) knowledge is provided. They are carefully analyzed and quantified to identify opportunities for further improvements to management processes. This level assumes the availability and use of appropriate tools. Such tools may include, for example, organizational structures, procedures and information technologies that provide audit, monitoring and examination of knowledge.

Based on the Maturity Models scale, which is based on determining the level of development of a business and IT system as a whole and its knowledge management system in particular from nonexistent (first level) to optimized (5th level), the auditor can determine:

- the current state of the business and its knowledge management system, that is, to assess what stage the business as a whole and its knowledge management system in particular are at the current time;
- the current status of best practice for knowledge management in the industry in which the business under study operates, that is, compare the specific business system and its knowledge management system being studied by the auditor with the best subject in the industry;
- the current status of the business and its knowledge management system in accordance with international best practices;
- the status of the business and its knowledge management system after their proposed improvement, that is, evaluate its business strategy for the results that it seeks to achieve in the field of knowledge management in the long term.

After identifying critical points and bottlenecks in the study area, Maturity Models allow the auditor to develop preliminary corrective recommendations and provide them with the management of the business under study. Then the auditor develops a strategy and tactics for bringing the business as a whole and its knowledge management system in particular to the desired level of knowledge management efficiency.

It should be especially noted that the nature of the relationship between the auditor and the managing and managed business systems depends on the conditions in which the audit of implicit (informal) knowledge is implemented regardless of its thematic focus (general audit of knowledge, assessment of corporate culture, collection and systematization of informal knowledge, interaction with business knowledge holders leaving this business, to identify their implicit (informal) knowledge, the existing innovative aspect, conducting on lying training or retraining of the staff of the business, the effectiveness of the use of social networks, etc.).

Therefore, even before the start of the audit, the essence of the audit engagement is necessary:

- inform interested business personnel about the objectives and terms of the audit study;
- to present to managers and knowledge holders the composition of the audit team and expert experts involved in carrying out the audit assignment;
- coordinate all the powers to access any, including confidential business information and its key knowledge carriers;
- agree on the duties and responsibilities of specific leading personnel of the business under study and key knowledge carriers;

- discuss the knowledge audit methodology;
- answer all possible questions that have arisen from the staff of the studied business regarding the essential aspects of the upcoming audit study.

When planning an audit of the knowledge of a particular business, the auditor should take into account that almost all of its subject areas should be subject to audit research. However, practice shows that the timing and scale of the upcoming audit do not allow to fully cover the entire business under study. Therefore, to improve the quality and effectiveness of the audit cycle, it is necessary to pre-select the most significant aspects for the business, constantly supplementing and expanding the range of studies both in the audit process on the merits of the audit engagement and in subsequent audit studies.

It should be specially noted that the planning process must be carried out in three consecutive and interrelated stages: preliminary planning (identifying areas of knowledge carriers that are significant for business), strategic planning (developing a strategy for the upcoming audit) and ongoing planning (developing methods and preparing tools for conducting substantive audits audit assignment).

Despite the fact that each of these stages has its own characteristics and some resulting individuality, however, their practical implementation is due to close interdependence, since any adjustments in one of them will necessarily lead to changes in the others. Therefore, when planning audit of implicit (unformalized) knowledge, it is necessary to be guided by the generally recognized principles of continuity, complexity and optimality.

At the same time, continuity in this context should be understood as the installation of specific tasks interconnected at all stages of the audit of knowledge for a group of auditors and specialists- experts. In its turn, the complexity of planning an audit of knowledge refers to the interconnectedness and consistency of all the previously mentioned planning stages. And, finally, the principle of optimal planning for this audit consists in the choice by the auditor of the most important subject areas for the business being studied, which will allow to obtain the greatest effect from the results of the entire audit cycle.

Starting the stage of a detailed audit of the essence of the audit engagement, as noted earlier, to study implicit (non-formalized) knowledge, the auditor should consider the possibility of using heuristic methods based on the admissibility, rationality and even satisfactoriness of the prepared management recommendations. The specified system of methods will allow us to assess the quality indicators characterizing the effectiveness of the functioning of the knowledge management system, and as a result of management decisions.

It should be borne in mind that the use of heuristic methods to assess implicit (non-formalized) knowledge and the entire knowledge management system at a qualitative level when performing a knowledge audit is due to:

- the qualitative nature of implicit (non-formalized) knowledge;
- significant uncertainty of the probability of their formalization;
- the current lack of technologies that allow the construction and study of a formalized model of this knowledge.

In this regard, the use by the auditor of expert assessment methods (questioning, interviewing, etc.) is noteworthy. However, these methods require a special approach to the formation of a group of specialists- experts with the proper competence in the subject areas being studied. Moreover, a group of specialists - experts can be both homogeneous and consist of specialists in various subject areas.

At the same time, it must be borne in mind that the practice of using these methods shows that their integrated application is most effective for solving the same problem. In addition, each of the methods, as noted earlier, involves some preparation for their implementation.

In addition to the specified qualitative methods aimed at identifying implicit (non-formalized) knowledge, a qualitative assessment of the knowledge management system and management decisions made on their basis,

during the audit of knowledge on the merits of the audit task, the auditor needs to conduct a study of knowledge flows, that is, to identify the relationship of personnel, business and IT processes and technologies. These studies will reveal the insufficiency or duplication of this or that knowledge, as well as the best practices and existing barriers in the business system for using both explicit (formalized) and implicit (non-formalized) knowledge.

3. Results

It should be mentioned that these approaches, implemented in an audit of knowledge, allow us to identify the likely success factors of the business under study. For this, in the course of the audit study, it is necessary to focus not on a separate group of specialists of knowledge carriers, but to try to cover the staff of the entire business. In this case, the key aspect is precisely the assessment of factors that can serve either as barriers to the use of knowledge or to facilitate an effective exchange of knowledge.

Thus, it should be noted that a detailed audit of knowledge allows us to determine the patterns of knowledge flows in business that form ideas about the approaches used to process information and, as a result, the efficiency of the use and exchange of knowledge in this system.

Practice shows that according to the results of the knowledge audit it is advisable not only to prepare a report and management recommendations, but also to conduct knowledge mapping.

Knowledge Maps are not only an appropriate way of fixing and exchanging explicit (formalized) knowledge, but also a reflection of implicit (unformalized) knowledge with varying degrees of detail. These documents enable managers of the business under study to understand what knowledge is needed for a particular business staff. In addition, they allow you to separate explicit (formalized) knowledge, which is inherently accessible information, from implicit (unformalized), requiring a special approach to them from the knowledge management system.

According to I.V. Kozlova, and with which one cannot disagree, the goal of developing Knowledge Maps is the formation of special documents in the form of a separate new intellectual product, which is essentially a source of knowledge, as they reveal the links between sources of knowledge or indicate gaps in existing knowledge assets (Kozlova, 2016). At the same time, Knowledge Maps should not be identified with knowledge stores, where the entire body of business knowledge is directly stored. Knowledge cards are a kind of guide to the indicated repositories, specialists, knowledge carriers, sources of knowledge, etc. The process of creating Knowledge Maps is mainly focused on the definition and planning of the knowledge management system of any business (Kozlova, 2016).

When creating Knowledge Maps to describe the subject area, it is most expedient to use thesaurus modeling of knowledge. This approach allows you to effectively use thematic thesauruses, which forms the basis of a systematic idea of the content of the concepts of the subject area and its structure, the development of logical, associative and creative thinking, training of memory and imagination.

At the same time, the thesaurus (from Greek language - treasure, treasury) is understood as structured and organized knowledge containing the most complete amount of vocabulary on a certain topic with an indication of clearly expressed semantic relations between concepts (Andrusenko, 2007).

Among a significant number of Knowledge Maps used in practice, we may distinguish the most general types of knowledge applicable to any business system (table 1).

Table 1. Knowledge Maps and their characteristics

Types of Knowledge Maps	Characteristic
Process Oriented Knowledge Maps	Reflect knowledge and its sources supporting the main business and IT processes of the business system. These maps are m\formed according to the results of a study of business operations and the external environment of the business.
Conceptual Knowledge Maps	Reflect the hierarchical classification in the form of concepts and semantic relations between them. Used when comparing similar business projects, turning knowledge into related and explicit (Kozlova, 2016).
Competency Maps	Reflect the skills of one or another specialist, his advancement on the hierarchical ladder and professionalism. Allow the management system to search for experts in various subject areas within the business system
Social Net Maps	Reflect knowledge graph and communication models of business systems among various groups of practitioners, business partners and other social environments. Allow to analyze ways of sharing knowledge in the process of collaboration.
Strategic Knowledge Maps	Reflect the share of business initiative in the development of a product, product or service
Advanced Development Distribution Maps	Show the experience and data of the use of various business processes by the business system. Directs a business system specialist who is interested in advanced developments in a specific subject area to business resources and groups that actively use advanced ideas

Source: own research

4. Discussion

As it was mentioned earlier, a report based on the results of a knowledge audit, as well as generated Knowledge Maps, are not a stage in completing the entire cycle of a specified audit. Research and practice of the implementation of the audit of knowledge shows that the greatest effect of the implementation of management recommendations developed on the basis of the audit is possible only with continuous monitoring of the process of their implementation and use. This approach allows you to timely carry out the necessary additional research and adjustments to management decisions made on the basis of audit recommendations.

Conclusions

Thus, it should be admitted that the knowledge audit cycle does not end with the stage of preparation and presentation of the audit report, but continues throughout the support of management decisions based on its results. An audit of knowledge accompanies these decisions until they are fully implemented, that is, until the final effect is obtained. Knowledge audit, similar to other types and methods of audit, aims to assess the current state of the business, but the main attention here is aimed at determining the availability of knowledge, further needs for them, establishing knowledge flows and their use in business processes to add value to the organization. Knowledge audit is an important tool for assessing the readiness of a business to implement a knowledge management system and further monitor its functioning.

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Liudmila KASHIRSKAYA

Professor, Doctor of the Economic Sciences, Financial University under the Government of the Russian Federation, Russia. Research interests – accounting expertise, state financial control, audit, departmental interaction, efficiency of activity.

ORCID ID: <https://orcid.org/0000-0002-0234-0223>

Alexey SITNOV

Professor, Doctor of the Economic Sciences, Financial University under the Government of the Russian Federation, Russia.

ORCID ID: <https://orcid.org/0000-0003-2221-4037>

Dilmurod DAVLATZODA

Candidate of Economic Sciences, Associate Professor, Russian-Tajik (Slavonic) University (RTSU), Tajikistan.

ORCID ID: <https://orcid.org/0000-0003-0115-7731>

Tatiana VOROZHEYKINA

Doctor of Economics, Associated Professor, Department of Production Organization, Russian State Agrarian University - Moscow Agricultural Academy named after K.A. Timiryazev, Russia.

ORCID ID: <http://orcid.org/0000-0001-7295-1372>

Register for an ORCID ID:

<https://orcid.org/register>

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WORLD EXPERIENCE IN THE APPLICATION OF ANTITRUST REGULATION AND COMPLIANCE SYSTEM*

Andrey Poltarykhin ^{*1}, Zhanna Dibrova ², Irina Kovaleva ³, Lidia Vasyutkina ⁴, Elena Potekhina ⁵, Olga Zinisha ⁶

¹Plekhanov Russian University of Economics, 117997, Stremyanniy Alley, 36, Moscow, Russia

²K.G. Razumovsky Moscow State University of technologies and management (the First Cossack University) (RAZUMOVSKY MSUTM (FCU)), 109004, st. Ground Val, 73, Moscow, Russia

³Altai State Agricultural University, 656049, Krasnoarmeysky Ave, 98, Barnaul, Russia

⁴Bauman Moscow State Technical University, 105005, 2-ya Baumanskaya ul., 5, str. 1, Moscow, Russia

⁵Russian State Social University, 129226, VilgelmPikstreet, thehouse 4, str. 1, Moscow, Russia

⁶Kuban State Agrarian University, 350044, Kalinina St., 13, Krasnodar, Russia

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

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Abstract. The article discusses the world experience in the application of the antitrust regulation system and antitrust compliance. The concept of antitrust compliance and antitrust regulation, the history of the emergence of antitrust regulation and compliance, the foreign practice of application, the features of the use of antitrust compliance in the Russian Federation are analyzed. The system of antitrust regulation is designed to ensure the effective functioning of economic relations of economic entities and reduce the risks of offenses. Antitrust compliance is a combination of legal and organizational measures aimed at compliance with the requirements of antitrust laws and prevention of its violation.

Keywords: antitrust regulation; antitrust compliance; foreign practice; risks; competition

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1. Introduction

Antitrust compliance is one of the tools to prevent and reduce antitrust risks, a system of intra-organizational prevention of violations of antitrust laws. The main objective of implementing compliance is to reduce the likelihood of antitrust violations by eliminating the risks of arbitrariness of the performer and sanctions. The term “compliance” is a term of foreign origin; on a Russian scale, the term “compliance” can be interpreted and enshrined at the legislative level as “corporate conscience”. Antitrust compliance (internal system for ensuring compliance with the requirements of antitrust law) is a relatively new institution for the Russian Federation. Antitrust compliance arose in the United States of America when there were a great many corporate violations in the 1970s and 1980s. They began to set significant fines, and firms were seriously worried about how to deal with this. The companies started on their own initiative to unite and develop what we call compliance - a certain concept that makes it possible to prevent violations and harmonize the functioning of companies with current legislation in the Russian legal field (Korableva et al., 2018). The doctrine of the antitrust compliance system is quite widespread abroad. In the Netherlands, there is no document of the antimonopoly body that would regulate the state’s position on this issue, although in practice the agency may ease the punishment in response to the obligation of companies to introduce compliance programs (Ivanova et al., 2019; Neizvestnaya et al., 2018).

2. Methods

The Russian practice of applying antitrust compliance is significantly different from the foreign one. In particular, attention was repeatedly drawn to the fact that the European Commission recognizes the importance of corporate program policies (documents). At the same time, the availability of these documents, compliance with the requirements contained in them, is not taken into account in the framework of antitrust proceedings, as part of the decision to impose fines (Luzina et al., 2019; Kuznetsova et al., 2019).

However, a number of member countries of the European Union still pay attention to the existence of antitrust compliance and following it at the national level may consider the possibility of applying extenuating circumstances and lowering sanctions against such organizations. So, in the UK and France, it is possible to reduce the size of the fine by 10%, and in Italy - by 15%.

Figure 1 below shows a comparison of foreign practices of antitrust authorities to take into account the company’s antitrust compliance program and extenuating circumstances when punishing a violation. It should be noted that only in France there is a legislatively fixed possibility of reducing fines. However, in the UK, France, Italy and South Korea, a quantitative assessment of the maximum possible size of the penalty reduction is indicated.

It should be noted that organizations, namely business associations, can independently develop guidelines for the implementation of the concept of antitrust compliance. In particular, the International Chamber of Commerce (ICC) Toolkit is developing such guidelines for the implementation of antitrust compliance procedures. Based on the developed recommendations, organizations can independently develop their corporate antitrust compliance strategy. Guidelines developed by the International Chamber of Commerce are presented with varying degrees of detail. This feature allows companies of various sizes and with different fields of activity / needs to choose the necessary level of detail of recommendations (Fig. 1).

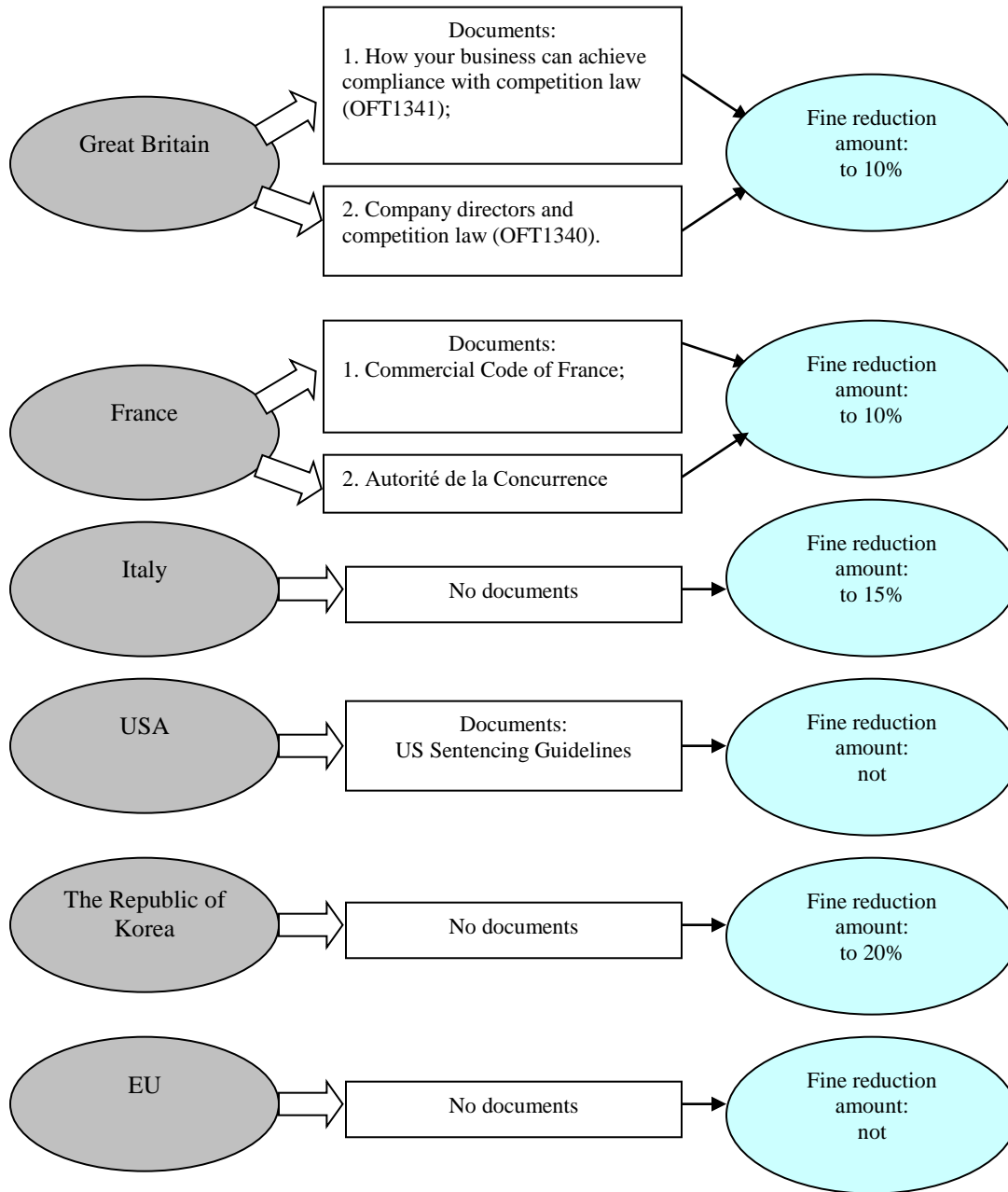


Fig. 1. Comparison of foreign antitrust practices regarding decision-making on extenuating circumstances if there is an antitrust compliance system
Source: The authors

In the UK, the main documents introducing the concepts of antitrust compliance are "How your business can achieve compliance with competition law (OFT1341)" (Government UK, 2011) and "Company directors and competition law (OFT1340)" (Government UK, 2011). In these documents, the presence of an antitrust compliance program is the basis for extenuating circumstances in the procedure for determining the amount of punishment in case of violation of antitrust laws. In a recommendation document describing the practical steps to create an antitrust compliance system, the agency directs companies to a four-stage approach (Fig. 2).

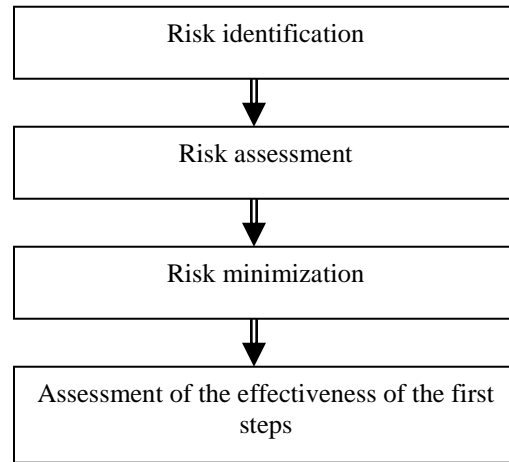


Fig. 2. Practical steps to create an antitrust compliance system

Source: The authors

The size of the penalty reduction according to these documents can be reduced by up to 10%.

In France, the concept of antitrust compliance is presented in 3 documents:

1. The possibility of reducing the liability of companies under article L464-2 of the French Commercial Code (Commercial Code of France);
2. Framework-Document of 10 February 2012 on Antitrust Compliance Programs. (Autorité de la Concurrence. 2012.) (Framework-Document, 2012);
3. Antitrust compliance and compliance programs. (Autorité de la Concurrence. 2012) (Framework-Document, 2012).

The main idea of these documents is that if a violation was discovered and eliminated in the organization under the current antitrust compliance program, this can be considered as a mitigating circumstance. Also, the adoption by the organization of the obligation to implement the antitrust compliance program after the violation is also a basis for mitigating liability. The fine in such cases can be reduced by 10%.

The Italian antitrust law does not contain rules that directly regulate exemption from liability or the application of extenuating circumstances in relation to violating companies as a result of the introduction of the antitrust compliance program. At the same time, the existence of an effective antitrust compliance system in an organization can be considered by the leadership on determining the number of fines for violations of antitrust laws as an environment that mitigates the responsibility of the violating organization (Feofanovich, 2019; Kopteva et al., 2019; Tarman, 2018; Prodanova et al., 2018a, b; Dyussembekova et al., 2019). In this case, the reduction in the amount of the fine can reach 15%, but taking into account the fact that the application of all extenuating circumstances will not result in a decrease in the fine of more than 50% (Guidelines on the calculation fines for serious).

In the United States, the "US Sentencing Guidelines" (USSC, 2015) is the antitrust compliance document. This document is for guidance only, however, the provisions of this document do not primarily apply. Despite the fact that due to the provisions of the US Sentencing Guidelines, the existence of an antitrust compliance system in organizations is a basis for mitigating circumstances (and may even exempt), the Department of Justice: Antitrust Division is not guided by the US Department of Justice this document in its activities. On the contrary, in another

department (Federal Trade Commission, FTC) there were cases when the presence of an antitrust compliance program in an organization was considered as a basis for reducing the size of the fine (Sherman Act). In the Republic of Korea, there are no special documents regulating the activities of organizations with an implemented antitrust compliance system. However, companies can go through the certification process with the antitrust authority of the Republic of Korea (Korea Fair Trade Commission, KFTC) (Fair Trade Commission, 2007). The company can go through this procedure after a year of implementation of the antitrust compliance program. If the organization has an antitrust compliance program that exceeds the rating “A”, mitigating circumstances may be applied to such a company, and the penalty reduction will reach up to 20% in case of an antitrust violation.

Thus, we can draw the following conclusions:

1. Documents developed by the antimonopoly authorities regarding antitrust compliance are primarily explanatory and advisory in nature;
2. The advisory nature in relation to antitrust compliance programs allows organizations to develop antitrust compliance systems, but does not oblige them to follow these recommendations;
3. Legislative consolidation of the possibility of reducing sanctions for the implementation of an effective antitrust compliance program in the framework of special documents (recommendations, clarifications) is quite rare (France). However, in practice, the introduction of corporate systems for the prevention of antitrust offenses is the basis for easing sanctions in the framework of proceedings, but the decision remains mainly a discretionary decision of the antitrust authority. The amount of penalty reduction can vary between countries from 10% to 20%;
4. The antitrust authorities of the USA and the EU (the US Department of Justice and the European Commission respectively) do not recognize the antitrust compliance system as a basis for mitigating punishment for violation of antitrust laws;
5. Some countries (Republic of Korea) do not have special documentation regulating the activities of organizations with an implemented antitrust compliance system. However, in such countries there is a procedure for certification of corporate programs in antitrust authorities;
6. An international association may be the developer of guidelines for the implementation of antitrust compliance. Thus, the International Chamber of Commerce has developed a document with varying degrees of detail, which allows companies of different sizes and specializations to choose the necessary level of detail.

U.S. competition law is one of the most detailed and durable. The main antitrust authorities in the United States are the US Department of Justice Antitrust Division and the US Federal Trade Commission. They are responsible for initiating legal proceedings against individuals who violate US antitrust laws and government controls, respectively. The resolution of disputes arising during the proceedings regarding antitrust laws is the responsibility of the Supreme Court of the United States of America. The first structures that the US administration tried to regulate were monopolies. Large enterprises neglected market discipline and set their prices through the consolidation of small organizations. These actions could lead to infringement of the interests of consumers and restriction of choice.

The specifics of antitrust regulation in the USA are considered in four directions:

1. Antitrust regulation in prevailing market structures;
2. Antitrust regulation of enterprises formed as a result of mergers;
3. Antitrust regulation of prices and market segmentation;
4. Antitrust regulation of compulsory contracts.

Considering the first case, it should be noted that the state is more loyal to the already established enterprises, which to one degree or another can be called monopolists. Thus, if the company owns 55% of market sales, it will not be subject to antitrust proceedings. An enterprise with such a (or higher) market share will be held liable only if actions are identified that forcibly support a monopoly position in the market, such as suppressing or deceiving competitors. An extreme measure may be the separation of the organization. The most famous example is the case against the American company AT&T (American Telephone and Telegraph). In 1982, AT&T and the United States Government agreed to split up the company, as AT&T was convicted of anti-competitive actions, which violated Sherman's law. As a result, 22 telephone companies were formed (139 years of AT&T, 2016).

The second case concerns the policy of antitrust regulation of enterprises formed as a result of mergers. This policy is aimed at preventing the consolidation of enterprises, as this leads to the emergence of a dominant position of an organization in the market.

In English, the term "to merge" means "unite" or "unite". Based on this, it can be argued that these terms are interrelated. Thus, enterprises can legally combine ownership of assets that were previously under separate control. The merger is one of the main dangers for competition, as it can lead to the fact that the participant can gain power in the market. The emergence of vertically integrated enterprises can lead to the fact that other more cost-effective industry participants may lose the ability to sell products (if the merger consists of one enterprise - the supplier, the second - the consumer).

According to US antitrust law, stimulating demand and finding new consumers are key aspirations for business mergers. Based on this, it can be argued. That consolidation can play a useful social role without harm to competition (Sharafutdinov et al., 2019; Fedulova et al., 2019; Magsumov, 2018; Saenko et al., 2019).

The US antitrust regulation regarding mergers is aimed at minimizing the number of transactions that could adversely affect competition. During the merger of enterprises, events of both the past and the present are analyzed to identify their position in the market and the economic consequences of this merger for competition.

When considering various cases of mergers, government agencies evaluate the degree of market concentration and market share indicators of merging enterprises (Ohlin, 2019; Trofimova et al., 2019).

When analyzing market concentration, the following indicators are used:

1. Threshold market share - an indicator of the size of the largest firms. This indicator is applicable only to one enterprise, does not characterize the structure of the industry market;
2. The concentration index is an indicator of the share of the largest enterprises. If this index is close to 100%, the market is monopolized. This index does not take into account imports, especially the market structure of the industry.
3. The Herfindahl-Hirschman Index (HHI) is a concentration index characterizing the market power of enterprises in a particular industry.
4. Linda Index - an indicator that determines the structure of the market and the degree of dominance on it. This indicator shows the degree of inequality between the leading enterprises in the industry.

The following types of mergers are distinguished:

1. Vertical;
2. Horizontal;
3. Conglomerate.

Horizontal mergers are the mergers of enterprises with identical products that compete with each other. The merger of such enterprises is allowed if their total market share does not exceed 15%. However, according to instructions from 1984, mergers of larger enterprises are permissible if one of them is close to bankruptcy.

Another significant point that deserves attention in the US antitrust regulation is price fixing. Antitrust authorities may institute proceedings against a small local organization that has set its price. To pass a sentence, you must prove that there was a conspiracy to set prices or a section of the sales market. An example is the case with ConAgra and Hormel, which paid \$ 21 million. as compensation for damage caused by fixing flounder prices nationwide (US Antitrust Development).

According to Kane's act, there is a ban on forced contracts. Thus, in 2006, the US antitrust authority filed a lawsuit against Microsoft for installing Internet Explorer into the main Windows 95 software product. The government interpreted that Microsoft illegally obliges users to install Internet Explorer.

The activity of monopolies is regulated by legislative and economic methods by the antitrust authorities, namely:

1. Legislative methods include a ban on market control, control over mergers, a ban on price fixing, a ban on agreements on granting exclusive rights.
2. Economic methods include the division into indirect regulation (taxation of excess profits) and direct regulation (setting limits).

In modern conditions, it is important to note the prevailing forms of antitrust regulation: regulatory impact and organizational.

In the first case (regulatory impact), regulation is based on the introduction of regulatory and legal acts that regulate production activities.

At the same time, organizational impact is achieved through the creation and empowerment of various organizational structures that affect economic relations. First of all, such organizational structures are understood as antitrust authorities.

The above forms and methods of antitrust regulation regulate relations between enterprises (participants in entrepreneurial activity) and the state.

To fully assess the practice of antitrust regulation in the United States, it is necessary to consider specific examples of the activities of antitrust authorities in relation to organizations to prevent the emergence of monopolies. Prominent examples will be the companies American Telephone and Telegraph and United States Steel.

AT&T is an American telecommunications company that until the mid-seventies was recognized as a monopoly in the US telephone service market. The enterprise created such conditions that all work, including the conduct of networks, repairs, manufacturing, could be carried out only at the expense of their forces. Moreover, the organization monopolized the communication of local subscribers with other countries. Thus, the US antitrust authorities revealed the formation of a monopoly in the market. When considering the case regarding AT&T, it was revealed that calls from the UK to the USA are several times cheaper. As a result, this served as the basis for the Federal Trade Commission to institute proceedings against the company. In order to avoid the imposition of penalties, the parties agreed to fragmentation of the enterprise. Thus, in 1984, 22 new telephone companies were formed (139 years of AT&T, 2016).

A second example is the case of United States Steel. This enterprise controlled the production of more than half of all American steel. The case regarding the enterprise began in 1912 and continued until 1920, when the Supreme

Court recognized that the enterprise was not a monopoly, as it was not involved in “unjustified” restrictions on trade. The court distinguished between the concepts of “monopoly” and “big business”.

Vivid examples of reducing sanctions in the implementation of antitrust compliance are practices from the UK.

In June 2011, in place of the obsolete OFT424 management (Office of Fair Trading), a new manual, “How your business can achieve compliance with competition law (OFT1341)” or “How your business can achieve compliance with competition law” (OFT1341), was developed Office of Fair Trading (OFT) in order for organizations to be able to independently enforce antitrust laws (Analytical report, 2015).

3. Results

The approaches proposed by the British agency are similar to those of the European Union: the Department of Fair Competition does not recognize the unified development of recommendations for all enterprises. The British approach is a risk-based approach. The main idea of this approach is that the company independently evaluates its risks in relation to violation of antitrust laws and develops a strategy (policy) in order to reduce these risks. This approach takes into account that the organization is aware of the following factors better than the authorities:

1. The market of the subject;
2. Characteristics of goods;
3. Market participants, etc.

The problem of responsibility of managers of different levels is very acute in the British leadership, since it is assumed that the implementation of the law requires the introduction of personal responsibility, since actions aimed at violating antitrust laws are a serious violation of labor discipline. In this regard, it is recommended to establish a person responsible for compliance with antitrust laws and the implementation of antitrust compliance, who will regularly report to senior management. Also, ordinary specialists should be able to report violations of antitrust laws. Moreover, both top management and ordinary specialists should undergo regular training and education in the field of antitrust law. All OFT proposals are very similar to the recommendations made in the EU guidelines. The main difference is that the European Commission does not consider the risks associated with the creation of cartels in as much detail as the UK Fair Competition Authority does (Features of international).

The basis for implementing the implementation of the antitrust compliance system is a four-stage system, the foundation of which is the commitment of the company's management to comply with antitrust laws:

1. The first stage is the identification of risks;
2. The second stage - risk assessment;
3. The third stage - measures to prevent risks;
4. The fourth stage is control and monitoring.

4. Discussion

Despite the general implementation system, attention is drawn to the fact that each company must choose the level of detail necessary for it in accordance with its characteristic level of risk of violation of antitrust laws and the size of the organization itself. Also, cartels and abuse of dominance are violations related to compliance.

However, the reduction of antitrust sanctions does not occur solely on the basis of the existence of an antitrust compliance program in the company. Only when the UK Competition Authority recognizes a system as efficient and corresponding to the four steps of the structure, as well as the size of the company and its characteristic level

of risk, the presence of an antitrust compliance system can be taken into account as a mitigating circumstance when making a decision (Voronkova et al., 2019; Yemelyanov et al., 2018; Akhmetshin et al., 2019; Zeibote et al., 2019; Vigliarolo, 2020; Chehabeddine, Tvaronavičienė, 2020; Lincényi, Čársky, 2020).

Implementation of an effective antitrust compliance system allows companies to:

1. Avoid or reduce financial sanctions in the face of early detection of an antitrust offense;
2. Reduce the size of the imposed fine to 10%.

Only two examples are known when these measures were applied in the antitrust practice of Great Britain:

1. Case against Arriva plc and First Group plc;
2. Case against Hasbro UK Ltd, Argos Ltd and Littlewoods Ltd.

The first case in relation to Arriva plc and First Group plc concerns violation of Section 2 of the Competition Act 1998. These companies entered into a market sharing agreement, which led to the restriction and distortion of competition of bus routes in the UK. Arriva plc was fined £ 318,175; to First Group plc - £ 529,852 (Analytical report, 2015).

Both companies managed to avoid punishment, as they submitted information to the antimonopoly authority regarding the activities of the cartel. Moreover, during the investigation, the agency took into account the presence of effective antitrust compliance systems for companies, which led to a 10% penalty reduction. At the end of the proceedings, the fine against Arriva plc was reduced by 36% and amounted to £ 203,632, and against First Group plc the fine was reduced by 100%.

The second case in relation to Hasbro UK Ltd, Argos Ltd and Littlewoods Ltd, also relates to a violation of Section 2 of the Competition Act 1998 as a result of a price fixing agreement between the companies. This agreement, according to the agency, had an impact on the market for children's toys and led to the restriction and distortion of competition in the UK.

Conclusion

The following penalties were imposed on the company as a result of the case: Argos Ltd - £ 17.28 million; Littlewoods Ltd - £ 5.37 million; Hasbro UK Ltd - £ 15.59 million (Decision of Director General).

At the same time, the aggravating circumstances for Hasbro UK Ltd turned out to be participation in the agreement of the company's management and arrangement of a conspiracy, which led to an increase in the fine by 20%. However, during the investigation, mitigating circumstances turned out to be disciplinary punishments for some employees, review and improvement of the antitrust compliance system, and conducting training courses, which led to a 10% reduction in the fine.

However, Hasbro UK Ltd managed to completely avoid financial sanctions, as it was the first to inform the antimonopoly authority of a conspiracy prior to the start of antitrust proceedings.

In these examples, we can see that the scope of the antimonopoly regulation bodies affects the interests of not only manufacturers, but also consumers, ensuring that one sells their goods on the market in a competitive environment, and the other - optimal prices for goods and services (this is confirmed by the first example). Moreover, antitrust regulation in the United States seeks to maintain competition, rather than limit it, providing the most preferential treatment to some groups of producers at the expense of others. The merit of the US economic system was not the presence of antitrust laws in it, but the fact that it did not constrain the objective process of concentration of production and centralization of capital, which resulted in the development of large corporations in the US economy.

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Andrey POLTARYKHIN

ORCID ID: <https://orcid.org/0000-0003-2272-2007>

Zhanna DIBROVA

ORCID ID: <https://orcid.org/0000-0001-5631-3573>

Irina KOVALEVA

ORCID ID: <https://orcid.org/0000-0003-0946-2714>

Lidia VASYUTKINA

ORCID ID: <https://orcid.org/0000-0003-2649-2886>

Elena POTEKHINA

ORCID ID: <https://orcid.org/0000-0002-7995-7424>

Olga ZINISHA

ORCID ID: <https://orcid.org/0000-0003-0159-9601>

Register for an ORCID ID:

<https://orcid.org/register>

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ADJUSTING STUDENTS' COMPETENCES TO THE NEEDS OF MODERN BUSINESS SERVICES SECTOR*

Ewa Multan

Faculty of Social Sciences, Siedlce University of Natural Sciences and Humanities, Siedlce, Poland

E-mail: ewa.multan@uph.edu.pl

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Abstract The modern services sector is one of the fastest growing sectors of the Polish economy. Business service centres have developed in the biggest cities. However, we may observe a growing interest in the development of high-tech industries in medium-sized towns. With increasing polarisation of space, it is a challenge to moderate disproportions (in various areas) between large urban centres and smaller towns of regional and subregional importance. It is a key element to ensure the social cohesion of a country and its sustainable spatial development. Medium-sized towns are "less tangible" in conducted studies. The potential of medium-sized towns to attract modern business services (MBS) depends on such factors as availability of qualified workforce, collaboration of investors/entrepreneurs, academic educational offer adjusted to the needs of the labour market, and moderated with government and EU documents and programmes. This study addresses the issue of the development of personnel for the business services sector (BPO, SSC, IT, B&R) which constitute a large developmental potential for the economy and ensures employment prospects for university (SUNSH) graduates as part of a project increasing competences in persons attending education at the university level, matching the needs of the economy, the labour market and the society. The aim of the article is to establish the specificity and assess the level of competences well as indicate key competences and the group of sensitive competence for the needs of the MBS based on empirical research conducted as part of the grant on "Competences of employees of tomorrow in business service sector" financed by the National Centre for Research and Development. The results of the study of competences allowed us to measure: knowledge, skills and attitudes so as to diagnose

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strengths in the competence profile and to indicate areas requiring improvement. In the context of polarisation, we presented the mechanism of managing competences in a trio of: business-science-government/local government, leading to the adjustment of the competence of university graduates to the needs of the MBS sector.

Keywords: MBS competence; competence management; business service sector; sustainable spatial development

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JEL Classifications: I21, I23, L84, H52, Q56,

1. Introduction

The modern services sector has been developing really dynamically in Poland for over ten years. According to the latest report of the Association of Business Service Sector Leaders (ABSL) in Q1 2019 there were 1,400 Polish and foreign BPO, SSC/GBS, IT, R&D service centres employing in total 307,000 persons (of which 80%, i.e. 247,000 in the foreign centres, and 20%, i.e. 60,000 persons in the Polish centres); there are 10% more of these centres as compared to last year (ABSL, 2019). Each year dozens of new service centres, mostly foreign ones, open in Poland. Therefore, this country is a leader in modern business services in Eastern and Central Europe and one of the most recognizable locations for offshore/nearshore service investments in the world (ABSL, 2019). Business service centres have developed in 11 agglomerations in Poland (Katowice, Bydgoszcz, Kraków, Lublin, Łódź, Poznań, Rzeszów, Szczecin, Tricity, Warsaw and Wrocław agglomerations). It was observed that the dominance of agglomerations over other centres remains overwhelming in the scope of fast-developing knowledge-intensive operations (Gillespie, Richardson, and Cornford, 2001; Stryjakiewicz, 2014; Śleszyński, 2018). Medium-sized towns are "less tangible" as according to EPSON report there is not enough systematic research going on in this field (EPSON, 2006). Prospects for growth of high-tech industries in medium-sized towns have been crucial in the late industrial and post industrial era (ABSL, 2019; Richardson, Marshall, 1996; Richardson, Belt, 2001). The development process is spatially unsustainable and polarisation follows, that means oppositions are formed (e.g. more developed vs. less developed regions), which results in the growth spilling over from the key regions to the less developed ones (Zajdel, 2011; Korenik, Pięta, Soczewka, 2004; Gorzelak 2000; Grzeszczak, 1997; Friedman 1973; Hirshman, 1958; Myrdal, 1957; Grycuk, 2017; Petrenko et al., 2019; Amraoui et al., 2019; Bublienė et al., 2019; El Idrissi et al., 2020).

The factor which creates dynamism in the development of industries is the simultaneous activity of entities in the trio formed by business, science and government/local government. Government documents (including the Sustainable Development Strategy for Poland) emphasise the development of medium-sized towns. The policy of local governments is also highlighted in the documents concerning development strategies for towns and is one of the criteria of attractiveness of a given location for modern serviced sector. Shaping attitudes supporting the sustainable development at every level of education plays an important role (Jakubiak, Cholewa-Wiktor, Sitko-Lutek, 2019; Volchik, Maslyukova, 2019). The main function of academic education in the local development is attracting human capital (good high school graduates) and "production" of university graduates who show high qualifications and competence (Faggian, McCann, 2006). The university development strategy, aimed at collaboration with the business sector, contributes to the adjustment of students' competences to the needs of the labour market and increasing graduates' (and students') employment opportunities in various sectors of the economy (Wójcik-Augustyniak, 2017). Moreover, the need to match supply and demand in the labour market with the support of structural funds (the ESF - the European Social Fund) is a requirement for EU member states in line with the *Agenda for New skills for Jobs* included in the *Europe 2020 Strategy* (the European Commission, 2010). The recommendation of the European Parliament regarding key competences for lifelong learning defines **competences**, as the combination of: *knowledge, skills and attitudes* appropriate for the situation; and **key competences** necessary for personal fulfilment and development, active citizenship, social

inclusion and employment (2006/962/EC). The European Parliament and the Council set out eight **key competences** (equally important because they may contribute to a successful life in a knowledge society):

1. communication in the mother tongue,
2. communication in foreign languages,
3. mathematical competence and competence in science and technology,
4. digital competence,
5. ability to learn,
6. social and civic competences,
7. sense of initiative and entrepreneurship,
8. cultural awareness and expression.

Projects aimed at universities, which are co-funded with the EU funds and institutions being a platform for an effective dialogue between the science and business spheres, turn out to be helpful. One of them is the National Centre for Research and Development (NCRD) established in 2007 as an executive agency of the Ministry of Science and Higher Education to execute tasks in the area of science policy, science and technology policy and innovativeness policy of the state. Since 2011 the NCRD has performed the function of the Intermediary Institution in Operational Programmes (in the EU 2014-2020 perspective) Knowledge Education Development and Intelligent Development. The structural policy of the EU also refers to the European Regional Development Fund (ERDF) which is aimed at the strengthening of economic cohesion of the Union by reducing disparities between regions.

2. Demand for competences in the modern business services sector

In line with the definition - applied by the ABSL (ABSL, 2017) and the Polish Investment and Trade Agency (Polish Information and Foreign Trade Agency, 2016) - modern business services include:

- Business Process Outsourcing (BPO) ,
- Information Technology Outsourcing (IT/ITO) ,
- Shared Services Centre (SSC) ,
- Research & Development (R&D) .

Entities providing modern business services are referred to as service centres (Grucyk, 2016). Reports on modern business services sector are published successively, prepared mostly by the Association of Business Service Leaders, and are commissioned by the Ministry of Development and Investment for example (ABSL, 2019). There are also publications of reports on research regarding key competences for increasing employability of students and graduates in various labour markets in Poland (NCRD, 2014). Moreover, since 2009 the Polish Agency for Enterprise Development (PARP) has been preparing the Study of Human Capital whose aim is to broaden the knowledge of the needs for qualifications and professions in industries (PARP, 2017).

In order to recognise the needs of the modern business services sector in the scope of competences expected from employees, ABSL conducted *a survey* among the members of the HR Club. It is a platform for collaboration, operating as one of the ABSL initiatives and gathering human resource managers in its member companies. *364 persons* from the HR Club distribution list responded to the survey. The participants were asked to indicate *a group of competences required in the labour market* and *those posing the biggest challenge* to companies from the MBS sector. Fig. 1 shows the demand for competences in the modern business services sector. The x-axis uses the scale from 1 to 5 for the competence importance level, whereas the y-axis uses the scale from 1 to 4 for the level of difficulty to acquire each competence (ABSL, 2019).

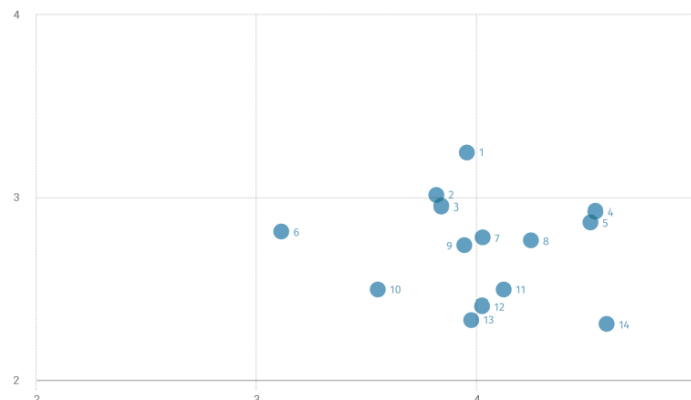


Fig. 1. Competences required in business service centres.

Source: Potencjał miast średnich w Polsce dla lokalizacji inwestycji BPO/SSC/IT/R&D. Analiza, ocena i rekomendacje/The potential of Polish medium-sized towns to attract BPO/SSC/IT/R&D. The analysis, assessment and recommendations (ABSL, 2019).

For the needs of this article, it was assumed that these required competences, which ranked highest in the assessment of the human resource managers are competence at the level 4 and 5 and they are the **group of sensitive competences** for the needs of the modern business service sector. The sensitive competences are very important (4) or necessary (5) and they affect the correct operations of entities in the modern services sector. The sensitive competences are: ability to work in a team (14), knowledge of foreign languages (4), ability to solve problems (5), ability to collaborate in an international environment (8), ability to communicate verbally (11), communicative writing skills (12), understanding of the topic that is the subject matter of the work (7). At the same time we may assume that the **key competences** are these that ranked as important (levels 3 to 4) based on the opinions of the human resource managers and their acquisition may contribute to a successful life in a knowledge society. The key competences include: organisational skills (13), leadership skills (1), cognitive skills (9), emotional intelligence (3), entrepreneurial skills and creativity (2), presentation skills (10), negotiation skills (6). To conclude the study of competence in modern business services, it may be observed that *soft competences* are in demand.

3. The Operational Programme Knowledge Education Development as a support for development of workforce for the modern business services sector

In 2017 the National Centre for Research and Development announced a call for projects supporting the development of workforce for the business services sector as part of Measure 3.1. Competences in higher education, III Priority Axis Higher education for the economy and development for 2014-2020. The call for proposals was from 8 May to 29 July. In the regulations for the call for proposals no. POWR.03.01.00-IP.08.00-BPO/17 (aimed at the execution of the objectives of the Operational Programme Knowledge Education Development), the target was **creating favourable conditions for business services to be based in smaller towns with the potential for development in this scope** and meeting the access criteria (Table 1). *The specific objective of OP KED* was supporting the development of workforce for the business service sector (BPO, SSC, IT) which constitute a large development potential for the economy and the employability of university graduates as part of increasing competence in persons attending education at the university level, matching the needs of the economy, the labour market and the society (NCRD, 2017).

Table 1. Selected access criteria under call for proposals no. POWR.03.01.00-IP.08.00-BPO/17

The access criterion	The wording of the criterion
Criterion 1:	The applicant may be a public or non public higher education institution hosting at least 100 students in full-time programmes The criterion does not rule out the option of including part-time students in the project.
Criterion 3:	By the date of signing the agreement with the NCRD to finance the project, the applicant had been obliged to <u>sign an agreement with at least one entrepreneur conducting business activity in Poland in the business services sector (BPO, SSC, IT) or with an entity conducting or intending to conduct business processes as SSC or by subcontracting them to external entities in Poland.</u> The entrepreneur had to be included in completion of all support components indicated in access criterion no.5.
Criterion 4:	The applicant had to ensure that <u>at least 30% of university graduates</u> who were covered by the support in the project took up employment with an employer operating in the business services sector within 6 months of their graduation. Employment is defined as concluding an employment contract for the period of minimum 3 months on at least half time basis. The application of the criterion obliged the provider to carry out activities aimed at the employment efficiency of project participants.
Criterion 5:	The applicant was obliged to anticipate activities relating to industries specified in the above mentioned access criterion no.3 which assumes <u>enforcement of all the components listed below:</u> — programmes for development of students' competences required from job candidates (based on the latest market research) by employers indicated in access criterion no.3, — inclusion of employers in the preparation of curricula and their implementation, — implementation of high quality internship programs for at least 30% of students educated in a given year covered with the activities under the project.
Criterion 6:	The scope of tasks and activities envisaged for realisation by the applicant in the project was intended to lead to the acquisition of at least two (including a compulsory linguistic competence) out of the following competences and qualifications in line with the needs of employers from the above mentioned sector: — vocational ones, — linguistic ones, — communicative ones, including ability to work in a team, interpersonal - in the scope of entrepreneurship, — digital ones, including information searching, — analytical ones, including problem-solving skills.
Criterion 8:	Project time span was at least 12 months and could not exceed 42 months.
Criterion 11:	In the scope of the obligatory element of competence development, the project had to cover <u>no fewer than 3 elements</u> (envisaged for Measure 3.1 in the Detailed Description of the Priority Axis Operational Programme Knowledge Education Development) solely out of the options listed below: — certified trainings (which end in obtaining qualifications and are recognised in the sector) leading to acquiring qualifications and/or workshops developing competences, — additional classes run in collaboration with employers, — additional practical tasks for students carried out on project basis, including project team work, — study visits at employers, — students' participation in activities resulting from the collaboration of the university with employers, increasing employers' involvement in the implementation of the curricula (e.g. additional classes organised with employers), aimed at better preparation of graduates to enter the labour market.
Criterion 13:	It was established that internship pay and pay for internship supervisors on the part of the employer could not exceed the maximum level (rates were calculated based on the notice of the President of the Central Statistical Office of 18 July 2016). Due to that reason the costs of these activities incurred as part of the project should be limited to reasonably set levels: — for student's monthly internship pay: 18.50 zloty gross per hour of internship task, — for a refund of a monthly pay for a supervisor on the part of the employer: 28.25 zloty gross per hour of interns' supervision, where the full rate is applicable for performing activities related to supervision over at least 10 interns fulfilling their internship duties. In other cases the amount of pay is calculated proportionately to the number of interns.

Source: Author on the basis of “Regulamin konkursu POWR.03.01.00-IP.08.00-BPO/17”/ “Regulations for call for proposals POWR.03.01.00-IP.08.00-BPO/17” (NCRD, 2017)

The allocation planned for the call for proposals POWR.03.01.00-IP.08.00-BPO/17 was PLN 100,000,000 with the maximum acceptable level of co-funding of the project of 97% (PLN 97,000,000), due to 3% own

contribution of the university (NCRD, 2017). The above mentioned allocation in the call for proposals allowed meeting the assumed ratios.

Table 2. Ratios under the call for proposals no. POWR.03.01.00-IP.08.00-BPO/17.

Result ratios	<ul style="list-style-type: none"> — amounting to 50% the percentage of university graduates covered with the ESF support who continued education or took up employment within 6 months of completing their education; — amounting to 30% percentage of university graduates covered with the ESF support who within 6 months of completing their education took up employment with an employer operating in BPO, SSC or IT sector; — 3,000 persons who improved their competences by benefiting from university activities supported with the ESF.
Product ratios	<ul style="list-style-type: none"> — 2,500 persons who were covered with the ESF support in order to increase their competences in the areas of key importance for the economy and development of the country; — 2,000 students who participated in internships supported with the ESF funds; — 680 persons covered with the ESF support under educational programs of general academic or practical profile, adjusted to the needs of the economy, the labour market and the society.

Source: Author on the basis of "Regulamin konkursu POWR.03.01.00-IP.08.00-BPO/17"/ "Regulations for call for proposals POWR.03.01.00-IP.08.00-BPO/17" (NCRD, 2017)

15 projects submitted by higher education institutions were approved and one project submitted by a state vocational higher education institution; it was also decided that projects may be subsidised with the amount of PLN 17,660,083.11 (i.e. 18.2% of the projected allocation) (ABSL, 2019). One of the winning projects, which was ranked third in the final ranking list, was the project of Siedlce University of Natural Sciences and Humanities (SUNSH) titled "Competences of employees of tomorrow in the business services sector", which is discussed later in this article.

4. About the project "Competences of employees of tomorrow in the business services sector"

In November 2017 SUNSH signed an agreement with the NCRD regarding the project "Competences of employees of tomorrow in the business services sector". Number and name of the Priority Axis: III. Higher education for the economy and development. Number and name of the Measure: 3.1. Competences in higher education. Subsidy received from the European Union: PLN 1,009,319.08, and the value of the project is: PLN 1,197,578.40. The project was run from 02.11.2017 to 31.08.2019. By the time of signing the agreement SUNSH had concluded an agreement with "Sokołów Logistyka" sp. z o.o. (access criterion 3). The project was aimed at 100 students of the two final semesters of full-time bachelor's studies being educated in the Faculty of Economic and Legal Sciences. There were two recruitment rounds, of which:

- I recruitment round - 50 persons (20 logistics students and 30 management students),
- II recruitment round - 50 persons (30 logistics students and 20 management students).

The project was intended to ensure support appropriate to diagnosed needs of individual participants in specific fields of study and educational effects, and the focus in the programme was on the areas in which students lacked behind. Actions taken made it possible for every person to participate effectively in the project and to acquire competences without distinction on the grounds of their sex, age, disability or the field of study. The need to develop competences was diagnosed in own research conducted in Siedlce University of Natural Sciences and Humanities (before the start of the project) and was identified in the documents: „Analiza kwalifikacji i kompetencji kluczowych dla zwiększenia szans absolwentów na rynku pracy ("The analysis of key qualifications and competences to increase graduates' opportunities in the labour market")(NCRD, 2014), „Bilans Kapitału Ludzkiego" (The Study of Human Capital)" (PARP, 2015)".

Own research allowed to show barriers and needs regarding competence improvement. The data showed that students mostly expected to be supported in the acquisition of *practical skills*, which may be acquired during trainings/workshops increasing their value in the labour market. They were interested in *study visits* so they could learn the employer's requirements. They pointed out at the need to acquire *skills to put knowledge to practical use*. At the same time, the research results proved that the majority of students are not fully aware of

the role of competence acquisition, which conditions a better start in the modern labour market. Project activities were intended to meet the expressed needs and eliminate the barriers: *the economic one* (high cost of trainings and low level of wealth), *the organisational one* (low accessibility of trainings in the local market), or *the social one* (overcoming students' unwillingness to get further training).

The aim of the project was the acquisition of competences necessary in the labour market by 90 logistics and management students at SUNSH in years 2017-2019. The desired objective was met by means of activities increasing competences of students educated in the Faculty of Economic and Legal Sciences in SUNSH. The results of the study were intended to prove that in line with access criterion 5 (and they proved that in the reports included in the project documentation) that persons covered with the support acquired new competences or perfected competences by attending (Table 3):

- competence improvement program (covering: A – certified trainings, B – workshops in English for Special Purposes, C – additional practical tasks carried out in the form of a project, D – study visits at employers),
- high quality internship programs (E – internships in business service sector entrepreneurs).

Table 3. Benefits associated with participating in the project "Competences of employees of tomorrow in the business services sector".

Form of support in line with Criterion 11	Field of study: Logistics	Field of study: Management
A. Trainings (the student received Vocational Competence Certificate).	1. Integrated ERP II systems supporting management processes in a modern enterprise. 2. Systems for presenting information in business. 3. Sales techniques. 4. Logistic and forwarding laboratory.	1. Standards in computerised accounting with the application of Comarch ERP Optima. 2. Sales techniques. 3. Outsourcing and offshoring in business processes. 4. Recruitment process outsourcing.
B. Workshops in English for Special Purposes (students received a certificate issued by the Foreign Language Centre of SUNSH).	1. English for Logistics.	1. English for Management.
C. Practical tasks carried out in the form of a project (students received a certificate issued by SUNSH).	1. Projects for an enterprise from the business services sector . 2. Designing logistic processes in transport. 3. Supply chain management.	1. Projects for an enterprise from the business services sector. 2. Human resources and payroll service. 3. Audiovisual realisation.
D. Study visits at employers.	11 visits were made in enterprises operating in the business services sector.	
E. Internships at entrepreneurs (students received intern scholarship).	90 agreements were signed with enterprises from the business services sector.	

Source: Author based on the application for project financing.

It was the intention of the project to educate, as part of the above mentioned forms of support, in the following competences which are in line with the needs of employers (access criterion 6) from the business services sector:

- vocational ones - important to increase industry-specific knowledge and the ability to put it to practical use,
- linguistic ones - necessary so as to communicate in English,
- communicative ones, including the ability to teamwork - crucial to build a relationship with colleagues,
- analytical ones, including problem solving skills - the ability to analyse available information,
- digital ones - necessary for the development of the digital society.

The acquired competences were confirmed in the study of competence before and after taking part in the project. The effort translated into the employment of 35% of the participants, in line with the result ratio and criterion 4. The activities planned in the project were intended to give students support in form of additional competences which meet the needs of the labour market (and these forms of activity were different from the courses offered in

the standard curriculum for the above mentioned fields of study). In this manner the project was intended to contribute to achieving the detailed objective of the OP KED which envisages *increasing competences of persons participating in education at the university level which meet the needs of the economy, the labour market and the society*.

5. Methodology employed to study competences in the project

The main objective of this article is to *define the specificity and to assess competence levels as well as to determine key competences and groups of sensitive competences for the needs of modern business services (MBS)*. The analysis of the level of competence will be carried out in relation to the specialisations project participants took during their studies. So as to achieve the set objectives we will solve the main problem and the detailed problems. The main problem is as follows: *Does the process of developing MBS competences lead to building key competences and the groups of sensitive competences?* The main problem will be solved based on the analysis of the following detailed problems:

1. What are the key MBS competences for logistics?
2. What are the key competences for management?
3. Do competences which ranked highest comprise the group of MBS sensitive soft competences?

Receiving the answers to the above mentioned questions will let us diagnose the level of competence acquisition in the process of their development in the business services sector.

The results of the study will allow us to verify *the main hypothesis* which is: **The process of developing competences leads to building key competences and sensitive competences for the needs of the modern business service sector (MBS)** and the following *detailed research hypotheses*:

- **H1:** Digital, analytical and vocational competences are the key competences for logistics specialist in the modern business services sector.
- **H2:** The key competences for management in the modern business service sector are digital, linguistic and vocational competences.
- **H3:** The sensitive competence group are soft skills which ranked highest in the opinion of the employees of the modern business services sector.

For the needs of the empirical study we assumed that the **key competences** are those which were ranked as important (level 3 to 4), which showed the biggest increase and may contribute to the successful life in a knowledge society, whereas competences from level 4 to level 5 comprise **the group of sensitive competences** for the needs of the modern business services sector. The sensitive competences are very important or necessary and they condition effective operations of entities in the modern services sector.

As part of the project, the study of competence was prepared - competence questionnaires/tests *at the start (for each participant) and at the end (at the end of the participation in the project)*, reports from questionnaire analysis were prepared. The competency test is a method which diagnoses competences by measuring knowledge, skills and attitudes, aimed at the diagnosis **of strengths of the competence profile and the competence gaps** (areas requiring development). The study of MBS competences consisted of five sections allowing the assessment of the level of competence of the respondents in the scope of: analytical competences (AC), digital competences (DC), linguistic competences (LC), communication competences (CC) and vocational competences (VC). The feature of competences is their *measurability* that is why the levels for each competence were established. Respondents differed in terms of the competence level that is why *a five-grade scale* was applied showing: the importance of the levels in the form of numbers (1 to 5) which at the same time illustrated *the scale of competence development*. The participants were asked to express the opinion of their competence level before and after the support. To measure competence the following were used:

- the diagnostic survey - *an auditorium questionnaire* which consisted in gathering respondents in one place (SUNSH) during a meeting. The role of the interviewer was to hand out questionnaires and give

explanatory instructions on how to complete them. The interviewer controlled the course of the research and then collected the questionnaires from the respondents (Szyjewski, Szyjewski, 2017); this method allowed us to analyse competences (those of logistics and management students) and the number of persons who adjusted their competences (vocational, linguistic, communicative, analytical and digital ones) to the needs of the MBS sector.

- *scaling* - we studied opinions of the participants who carried out *self-assessment* of their competences in the scale from 1 to 5 (where 5 is a very good level of competence, 4 – a good level, 3 an average level, 2 – a poor level, 1 - a bad level). The measurement of this scale included distinguishing quality characteristics in the reference population (professional group) (Stachak, 2006);

it allowed us to present the grade/level of competence held in the case when a respondent was a prospective/future employee and when they were already employed in the modern business services sector (when they had acquired competences required by employers);

- statistical methods - *the arithmetic mean* synthetically characterised the competences of project participants and enabled the assessment of their average level based on the competence study - test;

this method allowed us to indicate the key competences and the group of sensitive competences, including the soft ones, and the average values from the levels reached are presented in the next section of the article (Tables 4-5).

6. The analysis of author's own research

100 participants of the project "Competences of employees of tomorrow in the business services sector" attending logistics and management courses took part in the study which was conducted from 2017 to 2019. In the isolated group, women constituted the majority of the population studied. It is an important fact that the persons participating in the study were not employed at the moment of joining the project. The study of competences allowed us to assess the level of competence (graded from 1 to 5) in the scope of the following: analytical competences (AC), digital competences (DC), linguistic competences (LC), communication competences (CC) and vocational competences (VC). The results of the study will be presented separately for logistics and management students.

6.1. Key competences for logistics students

Based on the conducted study we assessed 63 competences of logistics students both in the first edition (2017/2018) and in the second edition of the project (2018/2019). As a result of the calculation, averaged summary grades were obtained (Fig. 2-3). The study measured: 11 analytical competences (AC), 8 digital competences (DC), 5 linguistic competences (LC), 9 communicative competences (CC) and 30 vocational competences (VC). The summary results are presented in Fig. 2-4 and the detailed account in Table 4.

While analysing the logistics students' level of competence in the 1st edition (Fig.2), it was observed that at the moment of joining the project they had a very low level of all competences – ranging from 2.2 (a poor level of digital competences), a poor level of: analytical competences (2.5), linguistic competences (2.6), vocational competences (2.7) to 2.9 (communicative competences). The study conducted at the end of the project, after the logistics students acquired (during their internship and development program) competences required by employers, proved that the competence level increased significantly, to the satisfactory or good level. The logistics students reached level 4 and above for vocational and communication competences. They also developed the competence level approaching the good level (4.0) with reference to analytical (3.9), digital (3.8) and vocational (3.7) competences.

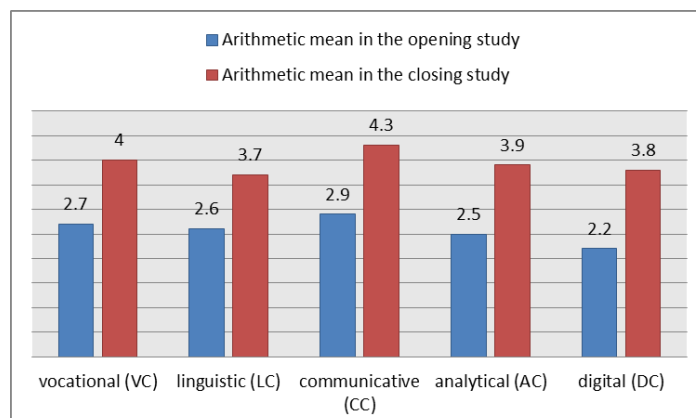


Fig. 2. Averaged level of logistics students' competences (1st edition).

Source: own elaboration

Information included in Fig.3 shows that participants of the 2nd edition of the project for logistics also presented a very poor level of competence. We estimated as follows: the lowest level in digital competences (1.9), similarly for linguistic competences (2.1), vocational competences (2.2) and communicative competences (2.3). Detailed results of the opening study prove that participation in the project contributed significantly to the development of competence levels in logistics students. The levels increased as follows: to 4.7 for communicative competences, 4.6 for vocational and analytical competences, whereas digital competences reached the level of 4.4 and linguistic ones the level of 4.3.

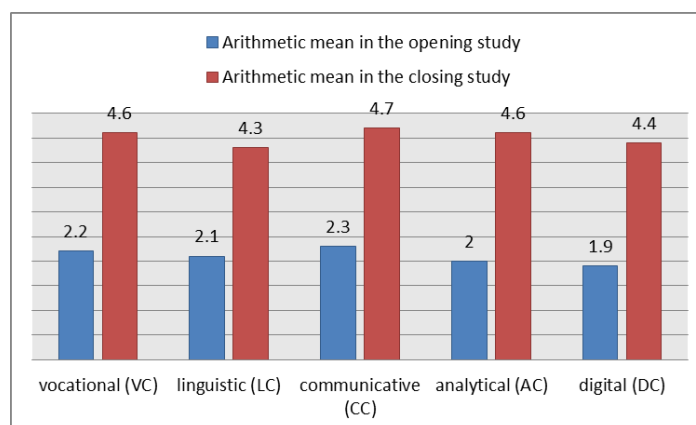


Fig. 3. Averaged level of logistics students' competences (2nd edition).

Source: own elaboration

Estimating the growth of competences in logistics students in the 2nd edition of the project (Fig.4), it was proven that the participants showed a significant increase in digital competences (DC) of 132%, also in analytical competences (AC) of 130% and of 109% in vocational competences required in the modern business services sector. Also, there was an increase in linguistic competences (LC) of 105% and communicative ones (CC) of 104%. The project contributed to the increase of logistics students' competences also in the 1st edition because digital competences (DC) increased by 73%, the analytical ones (AC) by 56%, and the communicative competences (CC) as well as the vocational ones (VC) increased by nearly 50%.

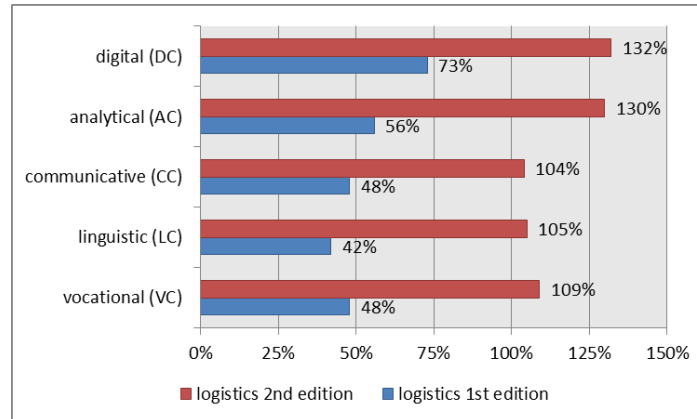


Fig. 4.Progress in logistics students' competences (1st and 2nd edition)
Source: own elaboration

In the course of conducted empirical research it was proven that in the modern business services sector **the key competences for logistics specialists** include *digital competences* ($\Sigma 204\%$), *analytical* ($\Sigma 186\%$) and *vocational competences* ($\Sigma 157\%$) which reflects the total increase in competences (Fig.4). **Hypothesis 1** was confirmed.

The first research problem was the following question: *what are the key MBS competences for logistics students?* To solve this research problem we will present the opinions of project participants on the level of competences in which the greatest progress was observed in both editions of the project.

As the summary shows (Table 4), all assessments of digital competences range from 2.65 to 3.4, with five of them rated on average above level 3 (none of the DC reached level 4 or above). In the opinion of logistics students the *key digital competences* (DC) are:

1. DC 2 - ability to search for necessary information in the real work environment using IT skills (3.4);
2. DC 4 - the ability to make business presentations (3.4);
3. DC 7 - the ability to analyse data using IT tools, ability to make business presentation/ prepare quotations, make data bases for businesses (3.25);
4. DC 8 - the ability to operate specialist software used to perform tasks in the internship position in the entity from the business services sector (3.05);
5. DC 5 - the ability to create data bases for enterprises (3.0).

The following seven competences, which ranked on average between 3 and 4.0, were pointed out as *the key analytical competences*:

1. AC 10 - the ability to analyse available information (3.85);
2. AC 11 - the ability to notice processes taking place in an organisation (3.5);
3. AC 8 - the ability to analyse data, data bases for businesses in connection with the implementation of projects for business services sector (3.35);
4. CA 1 - the ability to recognise and analyse main problems regarding the functioning of supply chains (3.3);
5. CA 5 - analytical knowledge and skills regarding business management processes (3.25);
6. AC 7 - the ability to operate specialist software used to perform tasks in the internship position in the entity from the business services sector (3.2);
7. AC 9 - the ability to analyse data, data bases for businesses in connection with the implementation of projects for business services sector (3.05);

Information included in Table 4 shows the assessment of vocational competences ranging from 2.9 to 4.3. Vocational competences (excluding VC 1 and VC 21) were assessed at levels from 3 to 4, which may prove the fact that these are the key *vocational competences* in the MBS pointed out by logistics students.

Table 4. the study of logistics students' competences (1st and 2nd edition)

Item no.	DIGITAL COMPETENCES	The opening study	The closing study	Average
DC 1	Skills regarding using ERP II software	2.0	3.6	2.8
DC 2	Ability to search for necessary information in the real work environment using IT skills	2.8	4.0	3.4
DC 3	Ability to use IT tools in the ERP II system	1.8	3.6	2.7
DC 4	Ability to make business presentations	2.8	4.0	3.4
DC 5	Ability to create data bases for enterprises	2.2	3.8	3.0
DC 6	Ability to plan and organise logistic processes in business entities using EPLedu software	1.6	3.7	2.65
DC 7	Ability to analyse data using IT tools, ability to make business presentation/ prepare quotations, make data bases for businesses	2.5	4.0	3.25
DC 8	Ability to operate specialist software used to perform tasks in the internship position in the entity from the business services sector	2.3	3.8	3.05
	ANALYTICAL COMPETENCES			
AC 1	Ability to recognise and analyse main problems regarding the functioning of supply chains	2.8	3.8	3.3
AC 2	Ability to solve problems arising while performing tasks entrusted in EPLedu software	1.7	3.5	2.6
AC 3	Ability to operate the EPLedu specialist software	1.5	3.5	2.5
AC 4	Analytical skills regarding the EPLedu functionality: input of business details, data regarding warehouses, fleet (optimising transport routes), product catalogues and the logistic process	1.7	3.8	2.75
AC 5	Analytical knowledge and skills regarding business management processes	2.4	4.1	3.25
AC 6	Ability to work in a group	3.7	4.4	4.05
AC 7	Ability to operate specialist software used to perform tasks in the internship position in the entity from the business services sector	2.4	4.0	3.2
AC 8	Ability to analyse data, data bases for businesses in connection with the implementation of projects for business services sector	2.6	4.1	3.35
AC 9	Ability to solve a problem in an innovative manner and to offer a suggestion on its practical implementation in executing projects in modern business services sector	2.3	3.8	3.05
AC 10	Ability to analyse available information	3.5	4.2	3.85
AC 11	Ability to notice processes taking place in an organisation	2.8	4.2	3.5
	VOCATIONAL COMPETENCES			
VC 1	Knowledge of ERP II class software	1.9	3.7	2.8
VC 2	Knowledge of quality management in the business sector	2.4	3.8	3.1
VC 3	Knowledge of product and warehouse management	2.7	4.0	3.35
VC 4	Ability to prepare enquiries and sales agreements	2.3	3.9	3.1
VC 5	Ability to prepare purchasing agreements and returns from suppliers	2.3	3.8	3.05
VC 6	Ability to work on projects for an enterprise in line with the accepted scope of responsibility	2.4	3.6	3.0
VC 7	Knowledge of cooperation between entities in the business services sector	2.4	3.7	3.05
VC 8	Problem-solving skills	3.0	4.1	3.55
VC 9	Knowledge of sales	2.9	4.1	3.5
VC 10	Knowledge of verbal and non-verbal communication in the sales process	3.1	4.3	3.7
VC 11	Ability to communicate effectively with a client	3.0	3.9	3.3
VC 12	Sales representative skills	2.4	3.8	3.1
VC 13	Knowledge of logistic processes planning and execution in businesses	2.4	3.7	3.05
VC 14	Knowledge of logistic solution implementation in businesses from business services sector	2.2	3.8	3.0
VC 15	Knowledge of overall logistics costs	2.8	3.6	3.2
VC 16	Ability to implement logistics solutions in businesses from the business services sector	2.3	4.0	3.15
VC 17	Knowledge of main problems in the functioning and development of supply chains	2.8	3.9	3.35
VC 18	Knowledge of competitiveness, cooperation and dominance in supply chains	2.5	4.0	3.25
VC 19	Knowledge of operation decisions in the functioning of supply chains	2.6	3.9	3.25
VC 20	Ability to select instruments to fix and develop supply chains	2.1	4.0	3.05
VC 21	Knowledge of the rules of keeping internal product catalogues	2.2	3.6	2.9

VC 22	Knowledge of the role of stock availability in an effective execution of the transportation process	2.5	3.7	3.1
VC 23	Knowledge of operations of businesses in the business services sector	2.3	3.9	3.1
VC 24	Ability to plan work	3.4	4.5	3.95
VC 25	Ability to organise own work	3.5	4.8	4.15
VC 26	Ability to effectively perform entrusted tasks	3.7	4.7	4.2
VC 27	Team-working skills	3.8	4.8	4.3
VC 28	Level of responsibility for entrusted tasks	3.8	4.4	4.1
VC 29	Ability to set and perform priority tasks	3.3	4.3	3.8
VC 30	Knowledge of processes, procedures, tools, methods and techniques used in managing businesses in the business services sector	2.4	3.9	3.15
COMMUNICATIVE COMPETENCES				
CC 1	Ability to communicate effectively with a Client, to use effectively verbal and non-verbal means of communication in the sales process	2.8	4.1	3.45
CC 2	Ability to ask questions and test Client's needs to control the conversation, to listen actively	2.9	4.3	3.6
CC 3	Communication skills to work within a new sales model and neurolinguistic programming skills	2.3	4.1	3.2
CC 4	Self-presentation, savoir-vivre and image building skills used in the work of a sales representative	2.9	4.4	3.65
CC 5	Ability to conduct negotiations according to the rules and various cultural factors	2.8	4.0	3.4
CC 6	Ability to prepare letters, documents, analysis and business presentations Communication skills in teamwork	2.4	4.1	3.25
CC 7	Ability to communicate with the superior	3.3	4.5	3.9
CC 8	Ability to communicate with a client	3.4	4.5	3.95
CC 9	Ability to resolve conflicts	3.4	4.5	3.95
LINGUISTIC COMPETENCES				
LC 1	Knowledge of English	3.0	3.9	3.45
LC 2	Knowledge of English specialist terminology for logistics	2.7	3.7	3.2
LC 3	Ability to build correct English language structures with reference to logistics terminology	2.5	3.6	3.05
LC 4	Ability to communicate freely and fluently in English using logistics terminology	2.4	3.5	2.95
LC 5	Language skills for work (in an internship position) in an organisation from the business services sector	2.2	3.6	2.9

Source: own elaboration

The Study of competences conducted among logistics students allowed us to point out competence gaps - areas requiring development (the average of below 3) in the group of the following ten competences:

1. LC 4 - the ability to communicate freely and fluently in English using logistics terminology (2.95);
2. LC 21 - knowledge of the rules of keeping internal product catalogues (2.9);
3. LC 5 - language skills for work (in an internship position) in an organisation from the business services sector (2.9);
4. DC 1 - ability to operate the ERP II system (2.8);
5. VC 1 - knowledge of ERP II class software (2.8);
6. AC 4 - analytical skills regarding the EPLedu functionality: input of business details, data regarding warehouses, fleet (optimising transport routes), product catalogues and the logistic process (2.75);
7. DC 3 - the ability to use IT tools in the ERP II system (2.7);
8. DC 6 - the ability to plan and organise logistic processes in business entities using EPLedu software (2.65);
9. AC 2 - the ability to solve problems arising while performing tasks entrusted in EPLedu software (2.6);
10. AC 3 - the ability to operate the EPLedu specialist software (2.5);

6.2. Key competences for management

In the scope of assessment of competences of management students participating in the 1st edition (2017/2018) and the 2nd edition of the project (2018/2019) the level of 62 competences was estimated, including: 11 analytical competences (AC), 7 digital competences (DC), 5 linguistics competences (LC), 9 communicative competences (CC) and 30 vocational competences (VC). The summary results are presented in Fig. 5-7 and the detailed account in Table 5.

The persons joining the management project (Fig. 5) demonstrated disturbingly low levels of linguistic competences - 1.9, of digital competences - 2.0, of the vocational ones - 2.5, of the analytical ones 2.6 and of communicative competences - 2.9. Participation in the project allowed the competences to develop to achieve a good level i.e. 4.1 for digital competences and to increase vocational, analytical and communicative competences to the level of 4.5.

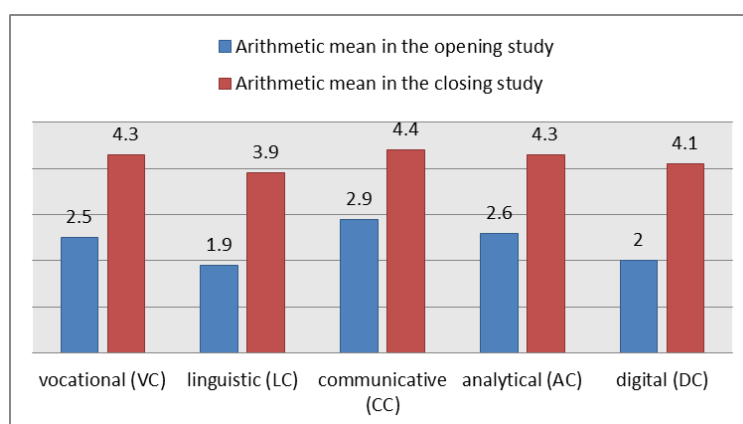


Fig. 5 Averaged level of management competences (1st edition).

Source: own elaboration

Competences of management project participants in the 2nd edition of the project (Fig. 6) also showed poor and extremely low levels from 1.8 for digital and linguistic competences, 2 - poor level (for vocational and analytical competences) and 2.1 for communicative competences. Despite the negative opening result, at the end of the project we observed a satisfactory, or good competence level for vocational, communicative, analytical and digital competences. The level of linguistic competences was close to a good level (3.8).

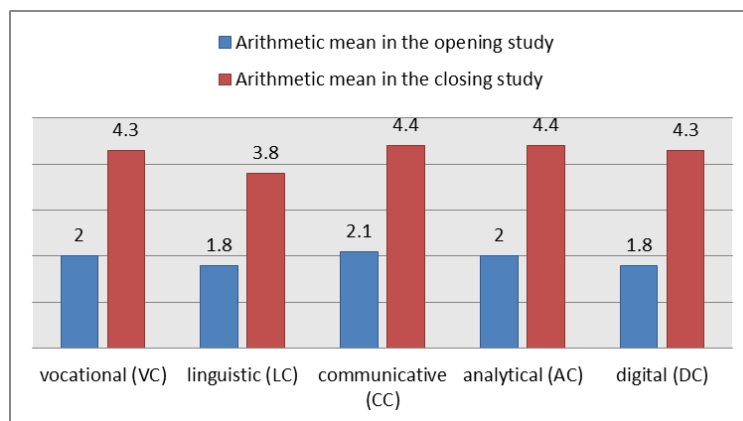


Fig. 6. Averaged level of management competences (2nd edition).

Source: own elaboration

Based on the obtained summary results (Fig. 7) it may be concluded that the project contributed to a significant increase of competences in management students', which is confirmed by an over 100% increase in the digital competences (DC) and linguistic competences (LC) as well as an over 70% increase in vocational competences and a 65% increase in analytical competences in the 1st edition of the project. The results of the assessment prove that in the 2nd edition all respondents confirmed an over 100% increase in their digital competences (DC), analytical competences (AC) and the vocational ones (VC).

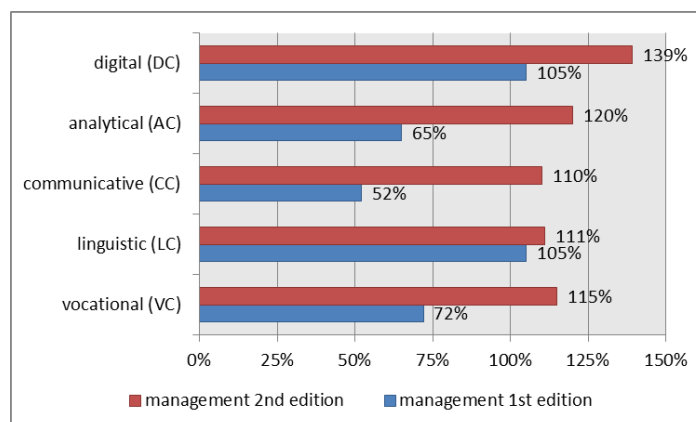


Fig. 7. Progress in management students' competences (1st and 2nd edition)

Source: own elaboration

In the course of conducted empirical research it was proven that in the modern business services sector **the key competences for management students** include *digital competences* (Σ 244%), *linguistic* (Σ 226%) and *vocational competences* (Σ 187%), which reflects the total increase in competences (Fig.7). **Hypothesis 2** was **confirmed**.

The second research problem was the following question: *What are the key competences for management?* To solve this research problem we will present the opinions of the project participants on the level of competences in which the greatest progress was observed in both editions of the project.

The distribution of results in Table 5 allows us to make a conclusion that the respondents (management students) pointed out five competences (apart from VC 3 and VC 4) assessed as the *key digital competences* (DC) and these are:

1. DC 6 - the ability to analyse data using IT tools, ability to make business presentation/ prepare quotations, make data bases for businesses (3.35);
2. DC 5 - the ability to use multimedia, i.e. produce and post-produce multimedia content (commercials, promotional videos, animations) for marketing, promotional and advertising purposes (3.3);
3. DC 7 - the ability to operate specialist software used to perform tasks in the internship position in the entity from the business services sector (3.15);
4. DC 1 - the ability to support an enterprise which applies full accounting using Comarch ERP Optima software (3.1);
5. DC 2 - the ability to support an enterprise which applies revenue and expense ledger (simplified accounting) using Comarch ERP Optima software (3.0);

The key vocational competences (in the opinion of management students) are 19 competences, i.e. these which were graded between 3 and 4 (apart from VC 3, VC 4, VC 9, VC 10, VC 13 and VC 19).

Table 5 presents *linguistic competences* in which an increase was reported in the opinion of management students - working in the service sector.

Table 5. The study of management students' competences (1st and 2nd edition)

Item no.	DIGITAL COMPETENCES	The opening study	The closing study	Average
DC 1	Ability to support an enterprise which applies full accounting using Comarch ERP Optima software (3.1);	2.0	4.2	3.1
DC 2	Ability to support an enterprise which applies revenue and expense ledger (simplified accounting) using Comarch ERP Optima software (3.0);	1.9	4.1	3.0
DC 3	The level of skills of preparing a VAT-7, VAT-EU tax forms as well as the annual tax returns and of sending various types of forms (to the e-form system) in Comarch ERP Optima programme	1.8	4.0	2.9
DC 4	The level of skills of calculating PIT-36, PIT-36L advance payments in Comarch ERP Optima programme	1.6	3.9	2.75
DC 5	The ability to use multimedia, i.e. produce and post-produce multimedia content (commercials, promotional videos, animations) for marketing, promotional and advertising purposes	2.2	4.4	3.3
DC 6	Ability to analyse data using IT tools, ability to make business presentation/ prepare quotations, make data bases for businesses	2.4	4.3	3.35
DC 7	Ability to operate specialist software used to perform tasks in the internship position in the entity from the business services sector	2.2	4.1	3.15
	ANALYTICAL COMPETENCES			
AC 1	Analytical skills regarding recruitment methods, tools and processes used by business in BPO	2.2	4.2	3.2
AC 2	Ability to maintain personnel registers and personal employee files	2.5	4.4	3.45
AC 3	Ability to maintain trainings records	2.4	4.3	3.35
AC 4	Ability to calculate pay and prepare payroll including various pay components	2.3	4.3	3.3
AC 5	Analytical knowledge and skills regarding business management processes	2.3	4.3	3.3
AC 6	Ability to work in a group	3.7	4.4	4.05
AC 7	Ability to operate specialist software used to perform tasks in the internship position in the entity from the business services sector	2.4	4.5	3.45
AC 8	Ability to analyse data, data bases for businesses in connection with the implementation of projects for business services sector	2.2	4.1	3.15
AC 9	Ability to solve a problem in an innovative manner and to offer a suggestion on its practical implementation in executing projects in modern business services sector	2.5	4.0	3.25
AC 10	Ability to analyse available information	3.3	4.3	3.8
AC 11	Ability to notice processes taking place in an organisation	2.6	4.3	3.45
	VOCATIONAL COMPETENCES			
VC 1	Knowledge and practical skills of creating cash registers using Comarch ERP Optima	2.2	4.2	3.2
VC 2	Knowledge and practical skills of creating bank accounts using Comarch ERP Optima	2.2	3.8	3.0
VC 3	Ability to analyse payments and financial situation using Comarch ERP Optima	1.9	3.8	2.85
VC 4	Ability to analyse settlements/ offsets of documents regarding business partners and employees using various methods in Comarch ERP Optima	2.0	3.7	2.82
VC 5	Knowledge of sales	2.9	4.6	3.75
VC 6	Knowledge of verbal and non-verbal communication in the sales process	3.2	4.6	3.9
VC 7	Ability to communicate effectively with a client	3.3	4.4	3.85
VC 8	Sales representative skills	2.5	4.1	3.3
VC 9	Knowledge of outsourcing management processes	1.8	4.1	2.95
VC 10	Knowledge of reasons for offshoring	1.7	4.2	2.95
VC 11	Knowledge of decision-making processes regarding the choice of investment location	2.5	4.4	4.7
VC 12	Knowledge of partnership building based on the stakeholders theory	2.0	4.1	3.05
VC 13	Knowledge of Capability Maturity Model (CMM)	1.2	3.6	2.4
VC 14	Knowledge of outsourcing in recruitment processes	1.7	4.3	3.0
VC 15	Ability to prepare business presentations, quotations, data bases for businesses in connection with the implementation of projects for business services sector	2.4	4.3	3.35
VC 16	Knowledge of HR and payroll support for a business entity	2.2	4.2	3.2
VC 17	Ability to use HR/payroll methods and tools for businesses Personnel records Payroll	2.2	4.3	3.25

	Supervision over trainings records			
VC 18	Skills relating to preparation of personnel and payroll reports for the management and external Clients	1.9	4.2	3.05
VC 19	Knowledge and skills relating to production and post-production of video content as part of multimedia projects for businesses	1.9	4.0	2.95
VC 20	Ability to work on projects for an enterprise in line with the accepted scope of responsibility	2.4	4.1	3.25
VC 21	Knowledge of cooperation between entities in the business services sector	2.3	4.1	3.2
VC 22	Problem-solving skills	3.2	4.4	3.8
VC 23	Knowledge of operations of businesses in the business services sector	2.2	4.4	3.3
VC 24	Ability to plan work	3.5	4.4	3.95
VC 25	Ability to organise own work	3.5	4.7	4.1
VC 26	Ability to effectively perform entrusted tasks	3.5	4.7	4.1
VC 27	Team-working skills	3.7	4.6	4.15
VC 28	Level of responsibility for entrusted tasks	3.9	4.6	4.25
VC 29	Ability to set and perform priority tasks	3.3	4.6	3.95
VC 30	Knowledge of processes, procedures, tools, methods and techniques used in managing businesses in the business services sector	2.4	4.1	3.25
	COMMUNICATIVE COMPETENCES			
CC 1	Ability to communicate effectively with a Client, to use effectively verbal and non-verbal means of communication in the sales process	3.0	4.4	3.7
CC 2	Ability to ask questions and test Client's needs Ability to control the conversation, to listen actively	3.0	4.4	3.7
CC 3	Communication skills to work within a new sales model and neurolinguistic programming skills	2.0	3.9	2.95
CC 4	Self-presentation, savoir-vivre and image building skills used in the work of a sales representative	3.0	4.6	3.8
CC 5	Ability to conduct negotiations according to the rules and various cultural factors	2.6	4.3	3.45
CC 6	Ability to prepare letters, documents, analysis and business presentations Communication skills in teamwork	2.8	4.3	3.55
CC 7	Ability to communicate with the superior	3.4	4.5	3.95
CC 8	Ability to communicate with a client	3.2	4.4	3.8
CC 9	Ability to resolve conflicts	3.3	4.4	3.85
	LINGUISTIC COMPETENCES			
LC 1	Knowledge of English	2.5	3.9	3.2
LC 2	Knowledge of English specialist terminology for management	1.8	3.8	2.8
LC 3	Ability to build correct English language structures with reference to management terminology	1.7	3.8	2.75
LC 4	Ability to communicate freely and fluently in English using management terminology	1.6	3.8	2.7
LC 5	Language skills for work (in an internship position) in an organisation from the business services sector	2.0	3.9	2.95

Source: own elaboration

The conducted study of competences (among management students) allowed us to point out competence gaps - areas requiring development (the average of below 3) in the group of the following thirteen competences:

1. VC 9 - knowledge of outsourcing management processes (2.95);
2. VC 10 - knowledge of reasons for offshoring (2.95);
3. CC 3 - communication skills to work within a new sales model and neurolinguistic programming skills (2.95);
4. VC 19 - knowledge and skills relating to production and post-production of video content as part of multimedia projects for businesses (2.95);
5. LC 5 - language skills for work (in an internship position) in an organisation from the business services sector (2.95);
6. DC 3 - skills of preparing a VAT-7, VAT-EU tax forms as well as the annual tax returns and of sending various types of forms (to the e-form system) in Comarch ERP Optima programme (2.95);
7. VC 3 - the ability to analyse payments and financial situation using Comarch ERP Optima (2.85);

8. VC 4 - the ability to analyse settlements/ offsets of documents regarding business partners and employees using various methods in Comarch ERP Optima (2.82);
9. LC 2 - knowledge of English specialist terminology for management (2.8);
10. DC 4 - skills of calculating PIT-36, PIT-36L advance payments in Comarch ERP Optima programme (2.75);
11. LC 3 - the ability to build correct English language structures with reference to management terminology (2.75);
12. LC 4 - the ability to communicate freely and fluently in English using logistics terminology (2.95);
13. VC 13 - knowledge of Capability Maturity Model (CMM) (2.4);

6.3. Sensitive competences for the needs of modern business services sector

The third research problem was the following question: *Do competences which ranked highest comprise the group of MBS sensitive soft competences?* To solve this problem, after **establishing** the diagnosis in the study of competence (based on Table 4 and 5) we will indicate strengths of the competence profile (Table 6). It is the **group of sensitive competences** (in the opinion of logistics and management students), which is represented in the competence profile (Fig. 8) with a line indicating a good competence level, i.e. ranking above 4.0.

Table 6. Sensitive competences of logistics and management project participants

Item no.	According to logistics project participants	According to management project participants	Average rating
1.	-	VC 11 - knowledge of decision-making processes regarding the choice of investment location (4.7);	4.7
2.	VC 27 - team-working skills (4.3);	VC 27 - team-working skills (4.15);	4.225 (~4.23)
3.	VC 28 - the level of responsibility for entrusted tasks (4.1);	VC 28 - the level of responsibility for entrusted tasks (4.25);	4.175 (~4.18)
4.	VC 26 - the ability to effectively perform entrusted tasks (4.2);	VC 26 - the ability to effectively perform entrusted tasks (4.1);	4.15
5.	VC 25 - the ability to organise own work (4.15);	VC 25 - the ability to organise own work (4.1);	4.125 (~4.13)
6.	AC 6 - the ability to work in a group (4.05);	AC 6 - the ability to work in a group (4.05);	4.05

Source: own elaboration

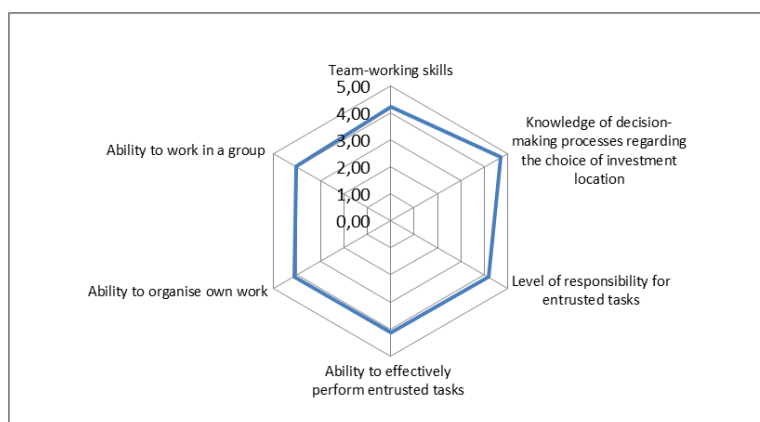


Fig. 8. The profile of sensitive competences in the modern business services sector

Source: own elaboration

Based on the obtained results (in logistics and management) it was proven that **soft skills**, which *ranked highest in the opinion of employees of the modern business services sector, constitute the sensitive group of competences*. **Hypothesis 3** was **confirmed**.

Conclusions of the analysis

In the face of sustainable spatial development and the challenges of space polarisation (agglomerations vs. medium-sized towns) developing MBS competences becomes a prerequisite to stay competitive and it creates opportunities for employees' development in businesses in the fast developing industry (BPO, SSC, IT, R&D).

Managing competences in the trio of business-science-government/local government takes place at the community level (the structural policy of the EU), at the national level (the system of higher education), at the organisational level (demand for competences for given sectors/developing competences in a flexible manner so as to match the needs) but also on the individual level of an employee who should ensure continuous development. The MBS competences are knowledge, skills and attitudes which condition, shape and develop organisations in the modern business services sector.

These are key and sensitive competences, including soft skills, which are characteristic for the desired and employed human capital, and which also find their way from the areas of key importance to the less important ones.

The research results confirmed that the key and sensitive competences are the most required in the business services sector, and the mechanism of adjusting competences to the needs of service centres is presented in Fig.9.

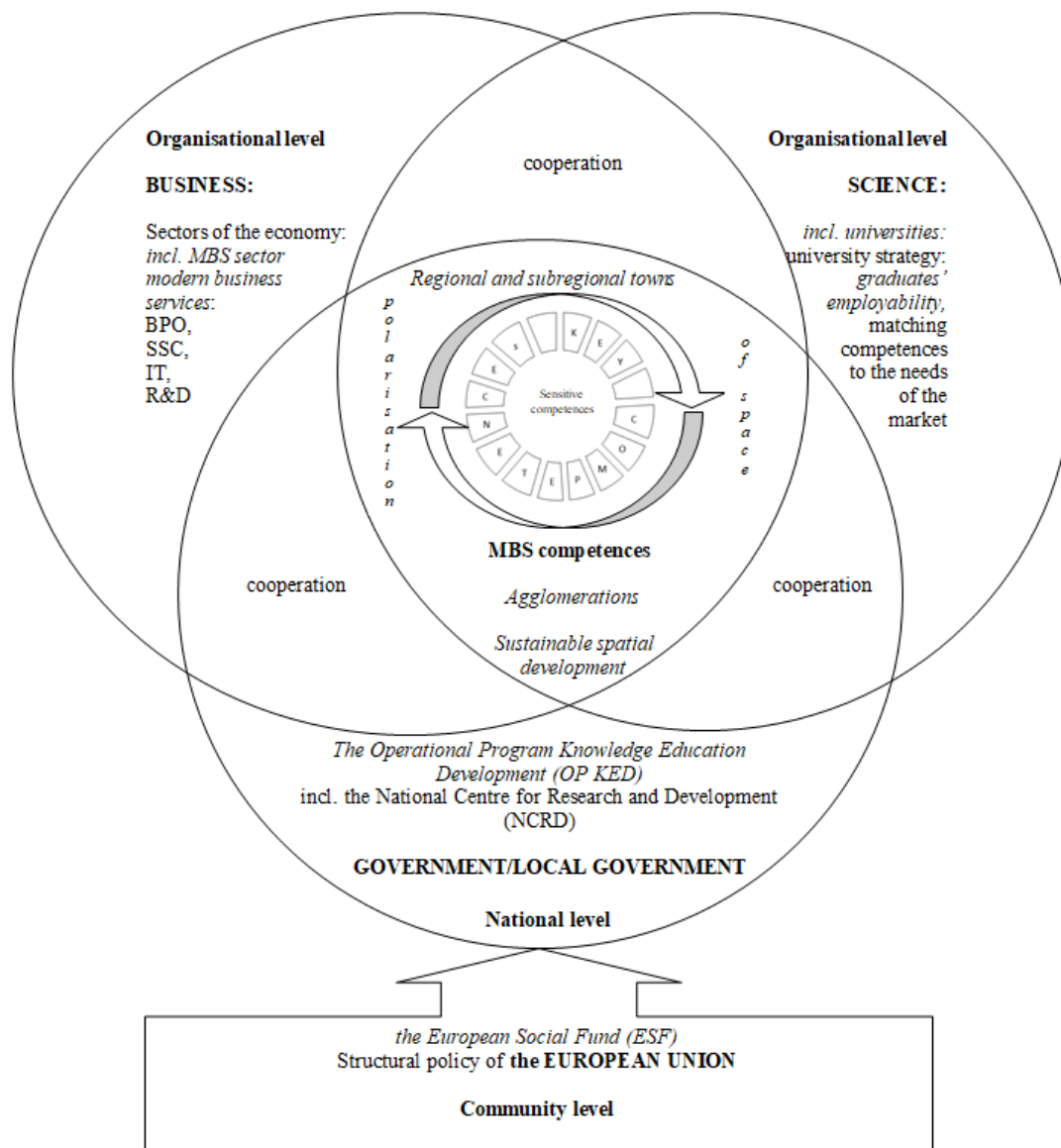


Fig. 9. The mechanism of adjusting students' competence to the needs of modern business services sector
(in the context of sustainable spatial development and space polarization)
Source: own elaboration

Based on the analysis of the obtained own research results, the discussion of competence specificity and determination of the key competences as well as groups of sensitive competences for the needs of modern business services we may conclude that the main objective of the article was achieved.

The main problem which was to determine whether the process of developing MBS competences leads to building key competences and the groups of sensitive competences was resolved. Moreover, the detailed problems were also resolved by pointing out the key competences and sensitive competences for the needs of modern business services. We diagnosed the level of competence acquisition in the process of their development in students participating in management and logistics projects. We also pointed out competence gaps - the areas which require development.

In the course of research it was proven that in the opinion of logistics students digital, analytical and vocational competences are of key importance in the modern business services sector. Whereas digital, linguistic and vocational competences are the key competences for management in the modern business service sector. It was proven that the group of sensitive competences may be these which were ranked highest by employees. All detailed hypotheses were verified positively, as a result we may state that the main hypothesis was confirmed, i.e. **the process of developing competences leads to building key competences and sensitive competences for the needs of modern business services (MBS).**

Defined by the National Centre for Research and Development in the call for proposals POWR.03.01.00-IP.08.00-BPO/17, access criteria and result ratios were achieved in the project "Competences of the employees of tomorrow in the business services sector", including ratios regarding the employment of the participants – university graduates. As a result of the implementation of the project, 35% persons covered with the support of ESF (SUNSH graduates) took up work within 6 months of completing their education (in the 1st edition of the project). The results for the 2nd edition of the project are still being monitored. With reference to the achieved employment and cooperation results documented with appropriate agreements (between SUNSH and entities from the business service sector) it should be stated that the project has a practical application and its product is MBS competences (the key and sensitive ones, including soft skills) which are most required in the service sector: BPO, SSC, IT, R&D.

In conclusion, the project implemented by SUNSH contributed to achieving the detailed objective of the OP KED which envisages *increasing competences of persons participating in education at the university level which meet the needs of the economy, the labour market and the society*. It was confirmed by comparison of the competence level of prospective employees (students) at the start of the project with the level of employees (interns) at the end of the project, when they acquired competences which are in demand. The research result showed the convergence of competences acquired by the project participants with the expectations of employers in the business services sector. Comparing competences which are in demand in the modern business services sector with those acquired by the project participants during the project, it may be argued that the latter match the needs of the economy and the analysed market in a medium-sized town. Accordingly, the study shows that the project "Competences of the employees of tomorrow in the modern business services sector" contributed to the attainment of the set objective - logistics and management students developed significantly their key and sensitive competences for the needs of the MBS. The project contributed to matching the participants' competences to the needs of the modern business services sector and led to the employment of the graduates of the university in a medium-sized town (in line with the Sustainable Development Strategy for Poland).

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Ewa MULTAN, PhD, is the Assistant Professor at Siedlce University of Natural Sciences and Humanities, Poland, project manager of "Competences of employees of tomorrow in the business services sector" project of the National Research and Development Centre co-financed by the European Union. Leader of "Liga Menedżerów Biznesu" (Business Managers League), a nationwide competition; leader of "Synergia nauki i biznesu" (Business and Science Synergy) conference; Research interests: human resources management, strategic management, including strategic analysis, network analysis and academic entrepreneurship.

ORCID ID: <https://orcid.org/0000-0003-4855-0645>

Register for an ORCID ID:

<https://orcid.org/register>

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INVESTMENT PROTECTION: DETERMINATION OF LEGAL ASPECTS WITH REFLECTING TO THE INNOVATIONS TO ENSURE SUSTAINABLE GROWTH OF THE SLOVAK REPUBLIC*

Mykola Sidak ¹, Ľuboš Cibák ², Edita Hajnišová ³

^{1,2} School of Economics and Management in Public Administration in Bratislava, Furdekova 16, 851 04 Bratislava, Slovak Republic

³ Comenius University in Bratislava, Faculty of Law, Šafárikovo námestie 6, 814 99 Bratislava, Slovak Republic

E-mails: ¹ mykola.sidak@vsemvs.sk, ² lubos.cibak@vsemvs.sk, ³ edita.hajnisova@flaw.uniba.sk

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Abstract. Ensuring sustainable growth of the Slovak Republic is not possible without effective state investment policy. The most important pillar of the analysis by investors is protection (guaranties, insurance) of investments. The research was based on analysis of main protection institutes of investments in Slovak Republic and member states of the European Union for example: multilateral and bilateral treaties on protection of investments, fair equitable treatment, full protection and security, non-discrimination standards, national funds guarantying investments, government guaranties and international, european and national legislation on investments, protection of investments by arbitration courts. Chosen decision of courts were subjects of analysis, their interpretation and common consent of their application. Base on research, the author proposed *de lege ferenda* for more effective legislation in investments and sustainable economic growth.

Keywords: investment; investment protection; legal aspects; sustainability

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1. Introduction

During last 70 years the Slovak Republic together with other 27 EU member-states created a single European economic space as well as Economic Union with the aim of a sustainable development of the European Union. In the authors' opinions, European inner single market is a unique international area of the equal investment opportunities with the high rate of investors' rights protection. The EU is permanently, methodologically, systematically, appropriately and effectively conducting a complex of organizational, technical and legal measures, aimed at the creation of stable and predictable conditions on the Economic Union's territory (Selivanova-Fyodorova et al. 2019; Zeibote et al. 2019). Such conditions are to facilitate investments' enlistment and maintenance, achievement of goals set while investing, effective investors' activities as well as protection of investors' legal rights and interests. Predictable, stable and clear investment environment in the EU has been formed. It has effective market principles of legal investment activities regulation (stated in the primary laws of EU as well as legal acts of the secondary law, e.g.: Investment plan for Europe and Acting plan for the creation of capital market union (CMU)); considering the territory of the EU member-states as one whole (as the territory of single economic area, based on four pillars: freedom of capital, people, goods and services movement).

It is worth to state that having used investment activities legal regulation, the EU public supervision subjects and EU member-states accumulate competencies concerning two legal institutions: institute of investment protection and institute of EU public interests protection (public safety, social rights, public health, consumers' rights protection and environmental protection). Aforementioned new tendencies have influenced the fact that in Slovakia and in the EU in general the concept of investors' rights protection and *de lege lata* of investment notion is completely changing.

The aim of this complex scientific and practical research is to determine the aspects of *ex lege* of investments protection within the EU taking into consideration innovations and analysis of modern tendencies *de lege lata* for the maintenance of the stable development in the Slovak Republic and European Union as well as preparation of conclusions and *de lege ferenda* concerning protection of intra-EU investments.

2. Literature review

The aforementioned problems were analysed by many authors. McLachlan, Shore and Weiniger state in their book "International Investment Arbitration" that "international common law did not prohibit distinctions between foreigners and nationals. To make up for this omission, the national treatment requirement, included in the majority of investment protection treaties, has the objective of finally providing an equal playing field for foreign investors (at least after they establish in the country)." The idea behind this standard is that states cannot stipulate differences between national and foreign investors, unless it is required for governmental public policy purposes. When this clause is present in a treaty, investors from a country have the right to receive the same treatment as local investors from the other BIT signatory country (McLachlan et al. 2007).

FDI are a global phenomenon whose share in international business is steadily rising and generates large capital injections. FDI has been and continues to be an important factor in the development of transition countries. They help to create new jobs, which can lead to an influx of new technologies, and in total they provide the necessary capital to restore a successful transition to the market economy. At the same time they enlarge economic power of investing country (Tvaronavičienė 2019; Globan 2018). Reinisch in his book examines the standards of treatment demanded by host states, which form the basis of contemporary international investment protection. It analyses the core standards commonly contained in bilateral and multilateral investment treaties, including 'fair and

equitable treatment’, ‘full protection and security’, and the non-discrimination standards. The burgeoning case law before arbitral tribunals has exercised a huge influence on how these standards are interpreted in practice. The essays in this volume, by leading practitioners and scholars in the field of investment arbitration, analyze the case law and provide a framework for a common consensus to emerge on how the standards should be applied in the future (Reinisch, 2008).

The financial market is a set of entities, instruments and transactions with the instruments in question and between the entities in question, bringing an indirect intermediation of financing connected with a risk of return (Sidak, Duračinská et al., 2014). Masood et al. (2019) analyze interconnection of macroeconomic variable and performance of financial markets. According to Sidak, Slezáková et al. the objective of financial market supervision is to contribute to the stability of the financial market as a whole as well as to the safe and sound functioning of the financial market in order to maintain financial market credibility, protection of financial consumers and comply with competition rules (Sidak, Slezáková et al., 2014).

Kriebaum is the analyses of the possibility of courts and tribunals operating in the fields of human rights and international investment protection to take into account the concerns of the other field of law. It is difficult to generalize the effects of investment on the enjoyment of human rights of the population of the host State. It is today acknowledged that investment is capable of generating economic growth, reducing poverty, increasing demand for the rule of law and contributing to the realization of human rights. For many countries the impact of private foreign investment flows on development is more significant than development aid by States and international Organizations. On the other hand, a number of human rights violations related to foreign investment have arisen and are likely to arise in the future. Host States can intervene in investment operations to stop human rights abuses of an investor. But such measures may at the same time be an interference with the investor's rights protected under investment treaties. In such a situation the investor can bring a case before an investment tribunal. On the other hand host States can also remain passive and tolerate human rights abuses by investors. In such a situation an investment tribunal will not learn about the case, but the victims of the human rights violations may bring the case before a human rights court or treaty supervisory body. This special issue shed light on the interaction between human rights law and international investment law (Kriebaum, 2013).

The impact of European Union law on investment arbitration proceedings arising from intra-EU and extra-EU bilateral investment agreements (BITs) remains matter of considerable debate. In the last years several arbitral tribunals expressed their view on the subject matter, raising constant suspicion by the European Commission and certain EU-member states involved in such proceedings. The book hence analysis the potential objections regarding the arbitral tribunal's jurisdiction and the merits of the case resulting from the interference of European Union law with international investment law. Although such consequence is disputed by several arbitral tribunals, the author supports that in intra-EU proceedings the tribunals lack jurisdiction. However, in extra-EU proceedings, the author suggests to transpose the Bosphorus judgement rendered by the European Court of Human Rights to investment arbitration proceedings to reduce potential conflicts and satisfy the diverging interests (Investment Protection in the European Union: Considering EU law in investment arbitrations arising from intra-EU and extra-EU bilateral investment agreements. Nomos Verlag. 2017).

Sornarajah and Muthucumaraswamy explains that inclusion of this term in investment treaties “allows nationals from Member States party to the agreement to make use of the favorable treatment granted to third country nationals by some of the contracting states.” In other words, if one of the States that entered into a BIT or a MIT grants benefits to an investor from a third country, the companies from the other country that have signed the treaty can claim the same treatment for themselves (Sornarajah, Muthucumaraswamy, 2004).

Other authors deal with individual factors and investment impact on economic development, respectively economic growth, and motivation of investors, economic, legal and political conditions created in a host country (Fabuš, 2018; Mamojká 2016, 2018; Lysiná et al. 2016; Vicen, 2014, Vicen, Haviarová 2013).

3. Changes in *de lege lata* of the investment activities in Slovakia and the EU

During last few decades legal regulation and investments protection in Slovakia and the EU were conducted by the normative international bilateral and multilateral investment agreements or agreements concerning foreign investments protection. Bilateral and multilateral agreements (e.g. Agreement on Energetic Chart which the EU, EU member-states and majority of the third countries have signed), as a rule, included normative provisions which regulated investor's status (national status or special status in the regime of most favored treatment), conditions of fair and objective investors' treatment, free investor's capital movement, protection from investment nationalization, creation of *ad hoc* of international commercial arbitration courts (which set disputes between the home country and the investor), conditions of state help provision to the investment project (benefits, facilitations, immunities, privileges concerning taxes and tax fees, free property usage etc.), system of compensation of investors' losses (according to the Directive of the European Parliament and Council of the EU 97/9/ES from 3.03.1997) and others. Over the last two decades bilateral and multilateral agreements together with the EU law have become parallel sources of investment relations in the European Union. During a few last years the Court of Justice of the European Union (CJEU) has accepted a list of decisions (C-284/16, *Achmea*, ECLI:EU:C:2018:158, 56, 58; C-67/08, *Block*, ECLI:EU:C:2009:92, 21; C-98/15, *Berlington Hungary*, ECLI:EU:C:2015:386, 28; C-197/11 a C-203/11, *Libert*, ECLI:EU:C:2013:288, 34; C-570/07 a C-571/07, *Blanco Pérez a Chao Gómez*, ECLI:EU:C:2010:300, 40; C-51/96 a C-191/97, *Deliège*, ECLI:EU:C:2000:199, 58, and others) concerning recognition as unjustified giving special legal status to investors and special legal regime for investments based on bilateral investment agreements (concluded by the EU member-states). For example, CJEU concerning *Achmea* case has conducted that contractual condition concerning the disputes between investors and the state which is fixed in the bilateral investment agreement within the EU violate the system of legal instruments of violated rights renewal fixed in the EU agreements as well as violate the autonomy, advantage and direct effect of the EU law and the principle of mutual trust between EU member-states. After a decision on the *Achmea* case has been made, September, 23rd, 2016, the European Commission has decided that bilateral investment agreements do not comply with the principles of the EU law and has sent to Slovakia (as well as Sweden, Austria, Holland and Romania) the demand of all bilateral agreements of investments protection termination.

It is worth to state (in order to avoid the wrong interpretation) that after termination of bilateral and multilateral agreements concerning investments protection the European Union lacks material and legal norms and mechanisms of investments protection, on the contrary, the EU law and EU institutions are normative and institutional pillars of investment protection: a) normative protection is based on the EU primary law, the Charter of the EU main rights, EU secondary law, legal systems of the EU member-states as well as the international law; b) institutional is based on the creation of judicial authorities of the European Union and the EU member-states.

It is also worth to state that taking into consideration the Agreement on European Economic Area, the EU main rights and EU normative and legal acts are also being used on the territory of the countries which are not the EU member-states, for example: Norway, Iceland, Liechtenstein (on the basis of the principle of investment protection the EU legal norms by the usage of *mutatis mutandis* regulate relations between the EU and aforementioned countries).

Therefore, the interim conclusions are to be made:

a) European Union having created the Economic Union, Monetary Union, Customs Union, Banking Union and others, are undergoing through natural stages of development, the highlight of which is the increase of the EU

institutions competencies. This, in our opinion, is relevant and maximally necessary for the effective and stable development of the European Union with the aim of achievement of the ambitious and high goals stated in the norms of law (concerning stable economic development, high level of social provision, price stability, low rate of unemployment etc.);

b) making the alternative system of setting disputes impossible by creating *ad hoc* of the international commercial courts as well as by creation of the system of the EU administrative and judicial authorities (concerning investments protection). This is the only right way as to setting disputes (using EU law and principles). It gives EU national judicial authorities the opportunity to appeal to the EU judicial authorities with prejudicial matters (based on Article 267 of the Treaty on the Functioning of the European Union) which is the basis for the appropriate application of the European Union legal norms (in the investment sphere as well).

4. Analysis of the current conditions *de lege lata* of the investments within the EU

The EU law, as a rule, does not use the notion “investment” or “investor” but rather uses more general notions as: resident and non-resident etc. In this context it is worth to state that based on the analysis of the CJEU decisions (C-452/04, Fidium-Finanz, ECLI:EU:C:2006:631, bod 32. C-281/06, Jundt, ECLI:EU:C:2007:816, bod 33) under *terminus technikus* “investment” it is necessary to understand economic activity which is conducted using one or a few main economic freedoms of the EU (without the necessity of gaining profit). In practice investment activity is based on four main freedoms in the EU: capital, people, goods and services movement (it is meant: investment actions, acquisition and creation of partnerships and companies, right to acquire real estate into property, conduction of activities with securities, gain of dividends and profit percent, commercial credits granting, acquisition of shares in investment, mortgage and credit funds etc., acquisition of patents and copyright, based on C-483/99, European Commission/France, ECLI:EU:C:2002:327, 36; C-578/10; C-580/10, Van Putten, ECLI:EU:C:2012:246, 28-36; C-255/97, Pfeiffer, ECLI:EU:C:1999:240). From 2019 European Union started to use the category “direct foreign investment” (having stated the legal definition of the aforementioned category), especially adoption of European Parliament and Council Regulation 2019/452 from 19.03.2019. Under *terminus technikus* “direct foreign investment” it is worth to determine any investment from the side of the foreign investor which creates long-term and direct relations between the foreign investor and the subject of entrepreneurship with the aim of conducting economic activity.

The EU law protects investments within the European Union during their whole investment cycle irrespective from the form of investment. It is considered that protection in the field of investments is conducted in three fields: A) *investor's (or investments') entry to the single European market (according to the Articles 49, 63 of the Treaty on Functioning of the European Union)*; B) *conduction of investment activities on the European inner market*; C) *completion of the investment activity on the EU market*.

Ad. A) Entry to the single European market can be conducted in several ways: creation of a new legal entity on the territory of the EU, creation of the separate structural unit of the legal entity on the territory of the EU member-state, capital movement from the EU member-state to other member-states, change of entity's location, acquisition of the legal entity, creation of the subject in the country different from the country of origin (based on the Court of Justice of the European Union decision (C-221/89, Factortame, ECLI:EU:C:1991:320, bod 20.), participation in public auctions (government procurements) for the state provision of the EU and EU member-states public authorities activities (based on Directive 2014/24/EU of the European Parliament and of the Council of 26 February 2014.), participation in public concessions (public purchase and public concessions must be conducted based on the principle of transparency, objectiveness and non-discrimination (based on the CJEU decision C-458/03, Parking Brixen, ECLI:EU:C:2005:605, 72; C-380/05, Centro Europa 7, ECLI:EU:C:2008:59, 120; C-458/14 a C-67/15, Promoimpresa, ECLI:EU:C:2016:558, 64-65), etc.

Ad. B) Conduction of investment activities on the European inner market. Creation of a new subject of economic entity or conduction of activities by the created separate structural units on the territory of the EU *host country* is regulated, first of all, by the EU law and only, second of all, by the inner legislature of the country in which activities are conducted. An important aspect of the legal application is the impossibility to use legal public norms. This, in its turn, restricts the freedom of people's and capital's movement (even if equal rights are distributed to the national subjects of the country in which activities are conducted (based on the CJEU decision C-55/94, Gebhard, ECLI:EU:C:1995:411, 27; common aspects C-52/16 ra C-113/16, SEGRO, ECLI:EU:C:2018:157, 65; C-179/14, European Commission, Hungary, ECLI:EU:C:2016:108), for example: qualification of the person (C-342/14, X-Steuerberatungsgesellschaft, ECLI:EU:C:2015:827; C-76/90, ECLI:EU:C:1991:331, 21.), licensing (C-496/01, ECLI:EU:C:2004:137, 65.), complex obligations concerning notification of the control authorities about the activities conducted (C-577/10, „Limosa“, ECLI:EU:C:2012:814, 47; C-490/04, ECLI:EU:C:2007:430, 89), social welfare of the employees (C-272/94, Guiot, ECLI:EU:C:1996:147, 14-15), etc). Investors have the right to: 1) establish the economic entity in any EU member-state; 2) create separate structural unit in another member-state (C-212/97, Centros, ECLI:EU:C:1999:126; C-167/01 Inspire Art, ECLI:EU:C:2003:512, bod 105); 3) change the entity's location; 4) conduct reorganization by association, annexation, division or transformation (Directive 2017/1132 of the European Parliament and of the Council), based on the freedom of people's movement. In aforementioned cases the EU member-state is obliged to admit legal creation or entity's location change, based on C-106/16, Polbud, ECLI:EU:C:2017:804, 65 (in the frame of the possibility to participate as a side in the legal dispute, based on C-208/00, Uberseering, ECLI:EU:C:2002:632; 9) It is worth to state that entity's location change with the aim of the EU member-state more loyal legal regulation usage is not a violation, based on C-106/16, Polbud, ECLI:EU:C:2017:804, 62.

It is also worth to consider three more aspects: 1) with the aim of people's (labor force) free movement it is worth to determine legal norms of the Directive 96/71/EU of the European Parliament and of the Council of 26 February, 1996. Directive 2014/67/EU of the European Parliament and of the Council of 15 May, 2014.; 2) the European Union by creating a single economic area (EU Economic and Customs Union) has provided rights of the investors who take part in real production industry according to Article 45 of the Treaty on Functioning of the EU; 3) the EU law regulates tax aspects of investments (value added tax, consumer taxes chosen and energy taxes). It is worth to mention here that creation and realization of tax policy is the competency of the EU member-states. The EU normative and legal acts determine the limits of the member-states competencies, for example, to reinforce restrictive rules or to use basis for double non-taxation, based on Chapter 1 Article 5 Directive 2011/96/EU from 30.11.2011 and decisions C-504/16 ra 613/16, Deister Holding, ECLI:EU:C:2017:1009, 51b 52, C-493/09-EK/Portugal.

Ad. C) Completion of the investment activity on the EU market. Investors' rights (which are regulated by the EU law) also include the freedom to determine the form, content and volume of investments (these freedoms can be limited only by using legal basis and in a certain way (C-201/15, AGET Iraklis, ECLI:EU:C:2016:972, 53)).

To conclude this part of the scientific research we will state that:

- 1) the EU law protects investors' rights from unwarranted limitations and discrimination. Investment discrimination and limitations can have different forms;
- 2) subjects of the EU member-states public administration must *a priori* follow the EU law while setting limits.

5. *Ex lege* basis of investors' rights limitation based on the institute of public interest in the EU law conception

Inner state limitations should be justified. Main rights and market freedoms are not absolute rights; that is why bodies of public authorities are obliged to compare them with public and legal goals while restricting them (public policy, public safety and public health) according to Article 52 of the Treaty on Functioning of the EU. Based on the analysis of the Court of Justice of the European Union decisions reasons justifying *ex lege* of the institute of public interest (in the EU law concept) one can add: a) environmental protection (C-400/08, EK/Spain ECLI:EU:C:2011:172, 74; Article 3 Clause 3 of the Treaty on European Union and Articles 11 and 191 of the Treaty on Functioning of the EU); b) consumers' protection (C-342/14, X-Steuerberatungsgesellschaft, ECLI:EU:C:2015:827, 53); c) creditors' and shareholders' protection (C-106/16, Polbud, ECLI:EU:C:2017:804, 53); d) integrity of tax system (C-204/90, Bachmann, ECLI:EU:C:1992:35, 28.) struggle with avoidance of paying taxes (C-72/09, Etablissements Rimbaud, ECLI:EU:C:2010:645, 33, etc.); e) employees' protection (C-341/05, Laval, ECLI:EU:C:2007:809, 103), etc.

All limitations must be made according to main principles and freedoms of the European Union law (which are sated in the EU legal acts):

- *The principle of proportionality* (restrictive legal norms must serve public goal, be systematic and methodological). Restrictive limitations will not be proportional and, therefore, legal if there exists alternative legal regulation which limits the freedom of people's movement (C-452/01, Ospelt, ECLI:EU:C:2003:493, 41), etc. It is worth to state that analyzing proportionality the Court of Justice of the European Union researches all the factual and legal aspects of the case. The obligation to prove the principle of proportionality compliance lies on the bodies of public authority of the EU member-state. Arguments, used by EU member-state as to the accordance of the inner legislation to the principle of proportionality, must be based on relevant adequate proofs or analysis of correspondence and proportionality of the restrictive norms (C-333/14, Scotch Whisky, ECLI:EU:C:2015:845, 53; C-52/16 a C-113/16, ECLI:EU:C:2018:157, 85.).
- *The principle of reasonable expectations* (C-17/03, VEMW, ECLI:EU:C:2005:362, 73-74.). It is possible to use this principle if investors act based on the principle of good faith (C-316/88, Krücken, ECLI:EU:C:1988:201, 23-24; C-5/89, Commission/Germany, ECLI:EU:C:1990:320, 14.), responsibly and with competency (C-310/04, Spain/Council, ECLI:EU:C:2006:521, 81). This does not mean that investors can expect that investment activities legal regulation, legal regime of investments and investor's legal status will be unchanged (C-17/03, VEMW, ECLI:EU:C:2005:362, 81; C-201/08, Plantanol, ECLI:EU:C:2009:539, 53). If legal regulation changes, EU and EU member-states must take into consideration the current investors' activities, except cases when justification is determined by the institute of public interest (C-17/03, VEMW, ECLI:EU:C:2005:362, 81; C-201/08, Plantanol, ECLI:EU:C:2009:539, 49).
- *The principle of legal confidence* is a general principle of the EU law. It means that normative and legal acts of the EU and EU member-states must be clear and predictable concerning their actions (especially with negative consequences (including financial ones as well) with the private entities, based on C-318/10, SIAT, ECLI:EU:C:2012:415, 58; C-17/03, VEMW, ECLI:EU:C:2005:362, 80; C-347/06, ASM Brescia, ECLI:EU:C:2008:416, 69; C-362/12, Test Claimants in the Franked Investment Income Group Litigation, ECLI:EU:C:2013:834, 44; C-17/01, ECLI:EU:C:2004:242, 34).
- *The principle of healthy economic competition*. On the EU single market must be provided competition and equal conditions for the business subjects, that is why EU member-states do not have the right to give public help to the economic entities as this does not correspond to the principles of the EU single market, based on Articles 107 and 109 of the Treaty on Functioning of the European Union.

Therefore, being based on the analysis *de lege lata*: 1) *all inner state restrictions must be made in accordance to the general rights of the EU Charter*. It is worth to mention here that foreign subjects (investors) use main rights and freedoms of the EU Charter and the EU law while conducting their investment activities (C-685/15, Online

Games Handels, ECLI:EU:C:2017:452, 56). The right to contractual freedom of investor, the right to be the owner of the property (this is the point where the right for compensation while nationalizing it and having public interest comes from), the right for justice security, the freedom for entrepreneurship conduction and others are very important for all investment activities entities. 2) *General EU rights and freedoms are not absolute and therefore, do not correspond to certain reasonable limitations* (accepted and appropriate that do not change the content of these rights and freedoms) if they are conducted with the aim of public interest protection which is stated in the EU law and are proportional (C-44/79, Hauer, ECLI:EU:C:1979:290, 15, etc.; C-5/88, Wachauf, ECLI:EU:C:1989:321, 18). 3) *Investors can demand to admit as non-legitimate inner state normative and legal acts, taking as an argument the fact that it violates the rules of economic competition.*

6. Mechanisms of investors' rights protection in the Slovak Republic and the European Union

Investors' rights protection is conducted on the territory of the EU *using different mechanisms for rights protection and setting disputes connected with their violation by public authorities* (rule making, justice or administrative authorities): A) *prevention of violations and non-judicial setting of disputes*; B) *renewal of investors' rights in the judicial way*; C) *investments protection by the European Commission.*

Ad. A) Mechanisms for violations and non-judicial setting of disputes:

1) *Prior approval of the content of inner normative and legal acts by the EU member-states with the European Commission as to their correspondence to the EU law.* Based on the Directive of the European Commission and the EU Council 2015/1535 from 9 September 2015, all projects of the normative and legal acts that regulate matters of freedom of goods and services movement must undergo through the analysis of the European Commission as to their correspondence to the EU law. The conclusion of the European Commission concerning legitimacy of the projects of normative and legal acts (by the EU member-states) is obligatory for the member-states according to the Treaty on Functioning of the EU, Directives of the EU Council 96/67/EU from 15.10.1996 and Directives of the European Parliament and EU Council 2010/13/EU from 10.03.2010. Prior analysis of the inner-state normative and legal acts which can limit entities' rights (freedom of goods and services movement, based on C-443/98, Unilever, ECLI:EU:C:2000:496, bod 40 a nasl.) based on the EU law (informing of the European Commission concerning adoption of the normative and legal acts and their analysis as to the correspondence with the EU law is also conducted). In this context it is worth to state that the aim of this institution is to provide equal conditions for the economic entities on the EU single market, based on Article 108 of the Treaty on Functioning of the EU. Authorized bodies of the European Commission for giving conclusions to the projects of normative and legal acts are a separate legal institution. It is separate from the institution of examination by the Court of Justice of the European Union of EU member-states violations while regulating social relations.

2) *Application of the legal norms by the authorities of public administration in correspondence with the EU law.* Bodies of public administration most often enter into administrative legal relations with investors. That is why, the aforementioned authorities are obliged to use the EU and EU member-state law norms appropriately in intentions determined by the EU. In case of violation, urgently and proportionally restore violated rights, freedoms and protected by the law investors' interests. Beside this, based on Part 3 Chapter 4 of the Treaty of Functioning of the EU and Decisions in cases C-476/1-Pepic, C-103/88, Costanzo, ECLI:EU:C:1989:256, 32; C-224/97, Ciola, ECLI:EU:C:1999:212, 30; C-341/08, Petersen, ECLI:EU:C:2010:4, 80, in case of the EU law violations by the inner normative and legal acts, the authorized bodies of the EU member-state are obliged to abrogate or derogate such normative and legal acts. Abrogation or derogation is conducted by the competent bodies for the appropriate and active usage of the EU norms and freedoms. It is worth to mention that legal institutions of abrogation and derogation are used by the competent authorities by their own initiative and without investor's appeal to the court to admit as non-legal the inner-state normative and legal act. Each investor has the right to provide proofs and arguments during decision-making process of the EU member-state public

administration authorities. Authorities of public administration are obliged to adhere to the principles of objectiveness, non-discrimination and appropriately justify them (C-55/94, Gebhard, ECLI:EU:C:1995:411, 37; C-19/92, Dieter Kraus, ECLI:EU:C:1993:125, 40; C-34/17, Donnellan, ECLI:EU:C:2018:282, 55). In case of violation of rights, freedoms and protected by the law interests, the member-state is obliged to return illegally received payments and percent for their usage (C-10/97 and C-22/97, IN.CO.GE.'90, ECLI:EU:C:1998:498, 24; C-591/10, Littlewoods Retail a.O., ECLI:EU:C:2012:478, 25 – 26; C-69/14, Dragoş, ECLI:EU:C:2015:662, 24).

3) *with the aim of appropriate and quick non-judicial resolution of trans-border problems with the EU law application on the territory of the EU member-state, the European Commission and EU member-states have created SVOLIT system in 2002.* The main task of SVOLIT system is to propose pragmatic decisions to physical and legal entities of the EU and European economic area while resolving disputes of rights and freedoms adherence by the public administration authorities.

Ad. B) Renewal of rights in the court is just one of different variants of dispute setting.

1) *Based on Part 1 Article 19 of the Treaty on European Union and Articles 6, 13, 47, 52 of the EU Charter concerning main rights (norms of law of which have a direct action), the EU member-states are obliged to create a system of authorities for the fair protection of physical and legal entities' rights and freedoms* (C-414/16, Vera Egenberger, ECLI:EU:C:2018:257, 78; C-64/16, ECLI:EU:C:2018:117, 29). It is also worth to state here that the Court of Justice of the European Union and European Court of Human Rights are convinced that judicial authorities are built on the principles of *independence, quality and effectiveness* (C-64/16, ECLI:EU:C:2018:117, 41; C-64/16, ECLI:EU:C:2018:117, 41).

2) *Inner-state procedures must provide effective usage of investors' rights which is based on the EU law.* Regulation (EU) No 1215/2012 of the European Parliament and of the Council of 12 December, 2012 reinforces regulation, which aim is to weaken and fasten the access to justice, especially by setting rules and competencies for the Court of Justice of the European Union in trans-border disputes. Procedural aspects of setting disputes is in the competency of the EU member-states, based on Directive 2007/66/EU. (C-612/15, Kolev, ECLI:EU:C:2018:392, body 70 až 72; C-279/09, DEB, ECLI:EU:C:2010:811, bod 59; C-362/12, Test Claimants in the Franked Investment Income Group Litigation, ECLI:EU:C:2013:834, 31). It is worth to state that procedural aspects are based on the principle of equivalence and effectiveness (C-169/14, ECLI:EU:C:2014:2099, 31).

3) *Investors have the opportunity to use a wide spectrum of instruments for their rights renewal juridically and in the inner-state court.* The instruments for rights renewal include: the judge's obligation to explain inner-state normative and legal acts; the judge's obligation not to take into consideration any activities which do not correspond with the norms of the EU law; recognition of losses reimbursement for the investor's rights violation; elimination of violation consequences as well as obstacles in the usage of their rights by the investor etc. (based on C-106/89, Marleasing ECLI:EU:C:1990:395; C-91/92, Faccini Dori, ECLI:EU:C:1994:292; C-188/10 and 189/10, Melki a Abdeli, ECLI:EU:C:2010:363, 43, 44; C-689/13, Puligienica, ECLI:EU:C:2016:199, 38; C-6/90 a C-9/90, Francovich, ECLI:EU:C:1991:428; C-224/01, ECLI:EU:C:2003:513; C-503/04, ECLI:EU:C:2007/432, 33.; C-276/07, Plantanol, ECLI:EU:C:2008:282, 23). Juridical rights renewal according to the EU law is possible even in case of violation EU member-states' constitutional norms according to the Decision C-213/89, C-46/93 and C-48/93, Brasserie du Pêcheur a Factortame. In this context it is worth to mention that minimal demands concerning non-contractual responsibility of the state for the violation of the EU law stated in Article 340 of the Treaty on Functioning of the European Union and Decisions *ex multi* C-46/93 a C-48/93, Brasserie du Pêcheur a Factortame, ECLI:EU:C:1996:79, 40, 41, 42.

4) *Consideration of cases by the Court of Justice of the European Union (CJEU)*. According to Article 19 Treaty of the European Union, the CJEU has the competencies to provide observance of the EU law on the whole territory of the European economic area and has a central place in provision of effectiveness and unity of the EU rules. The EU member-states' courts conduct their activities as the courts of the European Union. They are obliged not to use the norms of inner legislature if they contradict the EU law. If it is impossible to use the norm of the EU law appropriately in the court of the EU member-state, then the EU member-state court addresses the CJEU and asks it to make a prejudicial decision. The CJEU decision in prejudicial order is obligatory for usage by the national court of the EU member-state (C-689/13, Puligienica, ECLI:EU:C:2016:199, 38). And all bodies of public administration must accept to urgent implementation the CJEU prejudicial decision (C-231/06, C-233/06, Jonkman, ECLI:EU:C:2007:373, 38). The court is obliged to accept the decision without using the appropriate norm of national legislature if the decision of the EU Court has stated it as non-legitimate. The body of public administration which has accepted this normative and legal act, must conduct abrogation or derogation of the legal act (C-689/13, Puligienica, ECLI:EU:C:2016:199, 40). And if the case has been filed to the EU member-state court, and this case is impossible to file to the national court because of the absence of instruments and procedures in the national legislature of the member-state, then the national court will delegate this case to the consideration of the CJEU, based on Article 267 of the Treaty on Functioning of the EU. Before delegating the case to the consideration of the EU national court has to fulfill certain criteria: whether the judicial body is created based on the normative and legal act or is a constantly active body, whether its competencies are obligatory, whether its activity is *inter partes*, whether it's independent, whether uses legal norms (C-54/96, Dorsch Consult, ECLI:EU:C:1997:413, 23).

Ad. C) Investments protection by the European Commission. According to Article 17 of the Treaty on the European Union, the European Commission does not carry responsibility for the active usage, fulfillment and widening of the EU law implementation. In this context it is worth to mention that European Commission analyses and provides conclusions as to the correspondence of the projects of national normative and legal acts to the EU law. This, in its turn, provides protection of the investors' rights on the EU inner market. In case, if EU member-states do not take into consideration recommendations or conclusions of the European Commission in the investment field, then European Commission addresses the Court of Justice of the European Union with the aim of imposing sanctions on the violator-state, based on Article 260 of the Treaty on Functioning of the EU. Individual cases of investors' rights violation or not correspondence of the national normative and legal act to the EU law, the European Union does not consider as it belongs to the competency of the national courts of the EU member-states or the CJEU.

7. Conclusions

According to the aforementioned and directed by *ex scientia vera*, analyzing *de lege lata*, Court of Justice of the European Union decisions and scientific researches of national and foreign scholars, the author has elaborated the following conclusions as well as *de lege ferenda*: 1) Investments protection is one of the main tasks of the EU Economic Union. 2) Change of tendencies and concept of investors' rights protection in the EU has lead to termination of bilateral and multilateral investment agreements within the EU and was conducted with the aim of balancing of investors' rights and the EU public interest as well as creation of a new equal system of legal protection in the EU with equal rights of all members of the investment process. 3) Creation of a new system of investors' rights protection is one of the goals of the EU law usage and gradual creation (on the base of the EU) of interstate union with a harmonized legal system on its whole territory. 4) In context of creation of institutional provision of the EU stable development, with the aim of provision of constant organizational, legal, informational, guarantee, financial and other ways of support of the investment activity in the EU, the European Parliament and the EU Council have adopted Regulation 2017/1601 from 26.09.2017 and have created *European Fund for Sustainable Development (EFSD)*. 5) With the aim of provision of the stable economic growth and provision of safety, according to Regulation of the European Parliament and the EU Council 2019\452 from 19.02.2019

control of direct foreign investments from the third countries to the EU is conducted. 6) With the aim of determination of financial responsibility and adoption of decisions in investment disputes by the courts the European Parliament and the EU Council adopted on 23.07.2014 the Regulation 912\2014. 7) Investors' rights protection is conducted on the territory of the EU using different mechanisms and is aimed at protection of rights and setting disputes connected with their violation by the subjects (law violators) which are public bodies (law making, judicial or administrative bodies): prevention of violations and non-judicial setting of disputes; renewal of investors' rights in the courts; protection of investments by the European Commission. 8) *With the aim of appropriate and quick non-judicial setting of trans-border disputes using the EU law* on the territory of the European economic area *European Commission and EU member-states have created SVOLIT system* (for adoption of pragmatic decisions by the physical and juridical entities while setting the problems of compliance of rights and freedoms by the bodies of public administration). 9) Investors further during trans-border investing within the EU cannot use bilateral investment agreements that give investors special legal status which does not correspond with the EU law. 10) International commercial arbitration courts, national commercial arbitration courts or commercial courts created *ad hoc* (which were authorized by bilateral or multilateral investment agreements within the EU) do not have a status of the national judicial bodies, based on Article 267 of the Treaty on Functioning of the EU. Thus, they do not have a right to make any decisions concerning investment disputes. 11) EU member-states do not carry responsibility before the European Commission concerning the appropriate legal regulation of the investment sphere according to the EU law. 12) Member-states create their own system of investors' rights protection on the inner markets, for example in Slovakia in 2002 a public and legal cooperation – Guarantee Fund of Investments was created based on the law. This Fund has the aim to protect investors' rights on the financial market (to guarantee return of the investments to the volume of 50 000 euro). 13) After termination of bilateral investment agreements European Union conducts negotiation as to the signing of agreements with separate countries, for example with the USA the agreement concerning elimination of tariffs usage on the industrial goods – *TTIP* (Council Decision authorizing the opening of negotiations with the USA for an agreement on the elimination of tariffs for industrial goods, 6052/19, from 9 April 2019). EU and EU member-states and Canada have finished negotiation and on 21 September 2017 signed an agreement on fair trade - *CETA* (Comprehensive Economic and Trade Agreement).

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Prof. **Mykola SIDAK**, DrSc. is a professor at the School of Economics and Management in Public Administration in Bratislava (Slovak Republic). Scientific field: Public Administration, Administrative Law, Financial Law and EU Law.

ORCID ID: orcid.org/0000-0001-7173-3197

Doc. Ing. **Ľuboš CIBÁK**, PhD, MBA is an associate professor and a head of department at the School of Economics and Management in Public Administration in Bratislava (Slovak Republic). Research focused on investment protection and business law.

ORCID ID: orcid.org/0000-0003-3881-7924

JUDr. **Edita HAJNISOVA**, PhD, is an assistant professor at the Department of Commercial and Economic Law, Faculty of Law, Comenius University in Bratislava (Slovak Republic). Research focused on investment protection and commercial law.

ORCID ID: orcid.org/0000-0002-4895-8037

Register for an ORCID ID:

<https://orcid.org/register>

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SUSTAINABLE INVESTMENT PROJECT EVALUATION*

Tadeusz A. Grzeszczyk ¹, Małgorzata Waszkiewicz ²

^{1,2} *Warsaw University of Technology, Faculty of Management, ul. Narbutta 85, 02-524 Warsaw, Poland*

E-mails: ¹Tadeusz.Grzeszczyk@pw.edu.pl ; ²Malgorzata.Waszkiewicz@pw.edu.pl

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Abstract. This paper concerns a current problem of multifaceted evaluation of investment projects. Information that contains the actual value of the initiated investment is often the basis for making decisions regarding its further implementation, especially when significant changes occur in the project's environment. The process of project evaluation should therefore include all factors that may affect its value. However, there is a research gap regarding the insufficient development of methods of commercial real estate investment evaluation that integrate quantitative (financial) approaches and qualitative factors that influence the value of project, and also refer to the achievements in the scope of project management. The purpose of this paper is to introduce the integrated method of investment project evaluation based on the common valuation method (an income approach), supplemented by the results of the implementation of the Real Options Method (ROM) and complemented by the project sustainability factor. Case studies were carried out to prove that an exit option (resignation) can support the ongoing evaluation of the investment. Individual in-depth interviews (IDI) were conducted to examine the sustainability impact on its value. Three case studies involving commercial properties have verified the possibility of applying the proposed integrated method. The following findings were discovered as a result: nowadays, in the turbulent project environment, the common investment project valuation methods need to be extended to support the managerial decision regarding their further implementation and the securing of their flexibility. Also, sustainability has been recognized as a factor that increases the project value, which should be taken into account during the evaluation process. A comparative analysis indicates that the accuracy of the proposed new method delivers a more precise determination of the investment value than the common valuation methods.

Keywords: investment project; project management; project evaluation; real options; project sustainability

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1. Introduction

Investments of all kinds are associated with uncertainty (Haight & Singer, 2005). The dynamics of changes shaping the contemporary economic conditions forces investment projects to provide a certain degree of flexibility, easily defined as “an ability to change” (Asokan, Yarime & Esteban, 2017), or - from the system point of view – a feature that supports changes in the system (Ferguson et al., 2007). This is one of the reasons why evaluation of investment projects becomes an important scientific problem. Evaluation of a project’s flexibility has been described in the academic literature on the theory of real options and usually concerns evaluation of this parameter in relation to broadly understood investment projects (Borison, 2001; Lantz, Mili & Sahut, 2012). However, there are not many academic reflections addressing the flexibility of real estate investment projects in terms of their evaluation, e.g. real option application in pricing (Leung & Hui, 2002), which becomes a key issue given its specificity.

The purpose of this paper is to introduce the integrated method of investment project evaluation based on the common valuation method (in this case an income approach), supplemented by the results of the implementation of the Real Options Method (ROM) and complemented by the real estate sustainability factor. The proposed method is more precise and accurate than the commonly available valuation methods (thanks to incorporating the factor of sustainability) and could be particularly useful in terms of the significant and unexpected change in the project environment that occurs during project execution and enables to achieve planned deliverables. The results of the research on the new method proposed in this paper indicate that using the ROM in evaluation process helps better estimate the project’s final result and accounts for the flexibility of real estate. It also provides an additional support in making investment decisions by delivering a number of recommendations coming from exit option calculation and accounting for a sustainability level of the property. Incorporating the sustainability factor further clarifies the value obtained, which means that the integrated method of real estate evaluation enables more accurate results. The result of the comparative analysis indicates that the accuracy of the proposed new method is higher than standard evaluation methods. The arithmetic mean of the accuracy of the common valuation methods for the analyzed cases was 79.48%, while the arithmetic mean accuracy of the results obtained using the integrated evaluation method was 86.87%.

2. Literature Review

In this paper, a new method is applied to the cases of commercial investment projects. A common characteristic of commercial real estate is that the activities carried out in such properties (industry, retail or office work) tend to be profit-oriented. A specific feature of this sector is the high financial value related to the object of trade, which hinders operation in this particular sector. From the perspective of new investments in commercial real estate, the main problem is the high sensitivity to changes with the simultaneous low flexibility of this type of projects. The aspect of a long-term investment with large expenditures and the resulting high investment risk also need to be stressed. Therefore, it is necessary to include mechanisms that secure the flexibility of such projects in evaluation process. One of such mechanism can be implemented based on the ROM (Grzeszczyk & Waszkiewicz, 2016). The flexibility value, calculated against the ROM, ensures the investor’s possibility to react to environmental changes. It also secures the decision-making process by providing long-term recommendations. Companies use real options to value the flexibilities inherent in real estate development projects and active management is the most effective risk management tool in property development (Bauer, 2009). Also, flexibility equals a range of options an investor can choose from (Lucius, 2001). The exit option (resignation from further implementation of the project) has been selected for future research because it enables supporting an ongoing decision to either continue or abandon the investment project and a possible re-sale of the results obtained as part of its previous implementation. At this point it should be emphasized that the new method concerns an ongoing evaluation, i.e. evaluation during its life cycle, which continuously seeks feedback on how the project is progressing (Cleland, 1985).

The common real estate valuation methods (e.g. the investment method as part of the income approach) will serve as the basis for the structuring of a complex, ongoing real estate evaluation method. The investment method as part of the income approach is the most popular one in the case of commercial real estate (McDonald, 2015). This method allows to conduct the useful analysis of financial indicators, such as the net present value (NPV). It is useful only as far as it provides information on the possibilities related to the implementation of projects, but it does not properly support decisions regarding the selection of the most profitable alternatives (e.g. it does not help to compare the amount of expenditure incurred). For projects with a high risk, high uncertainty, and long payback periods, the NPV method can hardly assess the project value (Ma, Du & Wang 2018). Therefore, the financial evaluation of investment projects is difficult using the conventional methods of evaluation such as NPV and leads to major uncertainties (Götze, Northcott & Schuster, 2015). In this regard, common approaches do not take into account the qualitative parameters that may have a significant impact on real estate value, e.g. related to sustainability criteria or the flexibility of real estate investment. Using the NPV in the process of real estate investment projects evaluation may provide a basis for the evaluation method, but as such, the NPV is insufficient.

Improved accuracy of the results of real estate investment projects evaluation can be obtained through developing research on new evaluation methods, such as the decision tree analysis (DTA) that accounts for various scenarios, and the ROM. An approach based on decision trees plays an important role among real options evaluation methods. The DTA is useful in the face of an uncertain future and presents cash flows within a structure of a tree that shows possible scenarios during the lifecycle of the project (Shapiro, Mackmin & Sams, 2013; Cox, Ross & Rubinstein, 1979). The ROM enables dynamic adaptation to changing market conditions – it limits the losses arising from negative changes in the investment environment and takes advantage of opportunities that occur (Leseure, 2010). The real option analysis used in evaluation process quantifies the project value, and thus helps managers make rational decisions (Kodukula, 2006). A real option is a right (not an obligation) to make a managerial decision corresponding to real resources at a predetermined cost and price, within a specified time period (Rogowski, 2008). Some researches argue that an option is a right, but not an obligation, to sell or buy something in the future at a price determined today (Ball, Lizieri & MacGregor, 1998). It is possible to classify options the following way (Trigeorgis, 1996):

- to innovate,
- to expand,
- to defer,
- to contract,
- to stage investment,
- to abandon for salvage value (exit option),
- to switch,
- to shut down and restart.

As far as the exit option is concerned, which is a significant safeguard at the time of market changes forcing critical decisions, it complements the common real estate valuation methods with flexibility and allows the quantitative inclusion of evaluation results. It is also a useful tool that offers direct recommendations for decisions related to the further implementation of investment projects. In computational experiments presented later in this paper, the option to exit an investment was calculated, with its usefulness examined mainly for crisis scenarios for which changing environmental conditions makes it impossible to achieve the project's objectives.

The use of the ROM in real estate evaluation can be supplemented by taking into account the previously disregarded factor of sustainability. Standard factors of commercial real estate evaluation (e.g. office or retail buildings) include parameters related, among others, to location that one can specify as a fixed point in geographic space that must be linked to other complementary real estate parcels (Pearson, 1991) or technical

standards and maintenance of an organization's buildings and equipment, called Facility Management (FM) (Cotts, Roper & Payant, 2010; Piper, 2002). With that being said, sustainability should be considered as a multifaceted parameter that makes the result of the quantitative analysis more realistic. Literature studies covering research on the evaluation of investment projects and real estate valuation, carried out to identify qualitative aspects that had not been included in the evaluation process and that had a significant impact on the accuracy of the performed calculations, failed to contain the real estate sustainability factor. Although energy efficiency issues are raised in the literature as affecting the value of real estate (Bienert et al., 2019; Lombard, Ortiz & Pout, 2008; Crosby, Devaney & Law 2011), a broader view of real estate evaluation, which takes into account its sustainability, is not common. It seems necessary to empirically examine the significance of sustainability in the evaluation process and to explicitly incorporate sustainability into the real estate investment evaluation method. Therefore, real estate classification by the level of sustainability has been suggested. The resulting real estate classes support the managerial decision (continue, freeze or abandon the project that has already started) by recommending possible alternatives of further project execution. Nevertheless, each real estate investment project should be evaluated from the point of view of sustainability.

3. Methodology

To understand the ROM application, it is necessary to present the most important mathematical relationships. The ROM is a dynamic method that extends the calculation carried out using the NPV method with the flexibility factor and can be expressed by the following equation (Rogowski, 2008):

$$\text{RNPV} = \text{NPV} + \text{flexibility value}, \quad (1)$$

It is proposed to apply the traditional approach to the ROM, which is based on the Black-Scholes models and binomial trees. In the case of the exit option, in particular, binomial tree models are used, showing a step-like change in the current value of the underlying asset in each of the analyzed periods. This change may occur in two ways: the value of the underlying asset (V) may increase with the probability q or decrease with the probability $1-q$. In other words, in the analyzed period, a higher (uV) or lower (dV) value of the underlying asset can be achieved, where:

$$u = u/d, \quad (2)$$

where

u – rate of the underlying asset value increase,

d – rate of the underlying asset value decrease.

The calculations made in each node of the binomial tree allow to determine the optimal date of the option execution.

For the process of determining the value of the real option, the possibility to build a replicating portfolio was assumed. It consists of a base instrument and a risk-free investment and duplicates future cash flows generated by the option and is independent of changes in the underlying asset price. In comparison to the option, it gives the same value of the future return, therefore - in order to avoid arbitrage - the option and the portfolio must be sold at the same price (Rogowski, 2008).

In this paper no arbitrage was assumed, which means that there is no possibility of making a profit without risk. This situation may occur when the following condition is met:

$$u > 1 + r_f > d, \quad (3)$$

where r_f – risk-free rate (i.e. profitability of Treasury bonds).

The comparison of the calculation results of the intrinsic and total values of the exit option at the time of project implementation provides recommendations that significantly support the investment decision-making process. The decision rules for the exit option are shown in Table 1.

Table 1. Decision rules for the exit option

Decision	Condition
Continue project	$rez(V)_{w, i, n-t} < rez(V)_{i, n-t}$ (intrinsic value < total value)
Abandon project	$rez(V)_{w, i, n-t} = rez(V)_{i, n-t}$ (intrinsic value = total value)

Source: own study based on Rogowski (2008)

where:

$rez(V)_{w, i, n-t}$ – the intrinsic value of the exit option at time $n-t$,

$rez(V)_{i, n-t}$ – the total value of the exit option at time $n-t$.

Considering an example of modeling evaluation using real options regarding an investment project in the commercial real estate sector - this project is related to the initiated investment from which the investor is considering withdrawing. This option can be implemented in the next three years, after which time it expires, regardless of whether the project will have been a success or a failure.

The example presented below concerns a real project of an office building located in Warsaw. The NPV for this building was previously calculated using one of the common real estate valuation methods (income approach, investment method). The average capitalization rate was set at 7%. The market value of the project calculated by the NPV was about EUR 43 million. The financial benefits that can be achieved in the liquidation of the project were estimated at nearly EUR 25 million (EUR 24 893 000). This estimation was made based on available market data and an assumption was made concerning the stability of these costs over time. Therefore, the real option calculation described in this paper has the following assumptions:

- type of real option - exit option,
- evaluation method - traditional calculation of the simple real option with the decision tree analysis,
- underlying asset value changes continuously (application of „e” number, where $e=2,71828$).

The following equations are applied:

$$u = e^{\sigma\sqrt{T/t}}, \quad (4)$$

$$d = e^{-\sigma\sqrt{T/t}}, \quad (5)$$

where:

σ – volatility of the underlying asset,

T – number of years until the option expires,

t – number of subperiods,

when the flows are analyzed per year, then $\Delta t = 1$ ($t = T$),

under condition (3):

$$q = \frac{e^{(r_f - \delta)\Delta t} - d}{u - d}, \quad (6)$$

$$1 - q = \frac{u - e^{(r_f - \delta)\Delta t}}{u - d}, \quad (7)$$

where:

q – arbitration probability of increase,

1-q – arbitration probability of decrease.

When $\Delta t=1$, $z=30\%$ and $n=0,1,2,3$, then u, d, q and 1-q are given as it is shown in Table 2.

Table 2. Calculation data summary

Parameter	Value
V – total project benefit	PLN 185,000,000
LV – abandoned project benefit	PLN 107,040,000
t - type of analysis	annual
rf - annual risk-free rate (assumption)	4%
δ – cost of lost benefits (assumption)	7%
z – market variability	30%
T – period of analysis	3 years
u	1,3499
d	0,7408
q	0,3612
1-q	0,6388

Source: own study

The example of decision tree of the exit option value is presented in Figure 1.

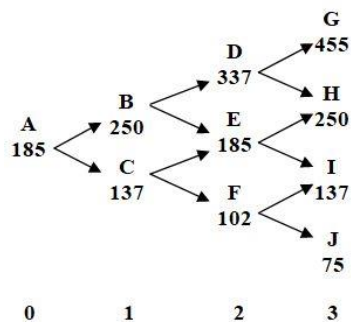


Fig. 1. Exit option value decision tree

Source: own study

In every node of the decision tree, the intrinsic value of the exit option has to be calculated according to the equation:

$$\text{int}(V)_{w,i,n-t} = \max[LV_{n-t} - V_{i,n-t}; 0] \quad (8)$$

The intrinsic value of the exit option in the form of a decision tree is shown in Figure 2.

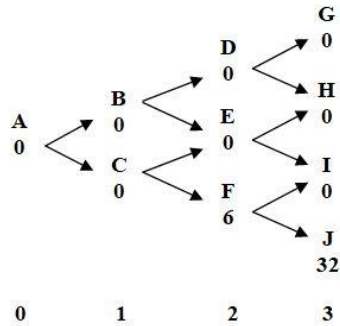


Fig. 2. Intrinsic value of the exit option

Source: own study

According to the principle of backward induction, in each node of the tree the calculation has to be performed following the equation:

$$\text{rez}(V)_{i,n-t} = \max \{ [\text{rez}(V)_{i,n-t+1}, \text{increase } q + \text{rez}(V)_{i,n-t+1}, \text{decrease } (1-q)] e^{-rf}; \text{rez}(V)_{w,i,n-t} \}, \quad (9)$$

where:

$\text{rez}(V)_{i,n-t+1}$, increase – the value of the exit option in the i -node at time $n-t+1$ concerning the option growth comparing to the previous period. An adequate equation is used when the option value decreases at time $n-t+1$.

Total value of the exit option is shown in Figure 3.

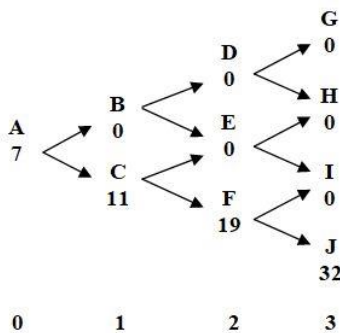


Fig. 3. Total value of the exit option

Source: own study

The ROM brings the result of its total value, which increases the NPV calculation and also supports the decision-making process. At the moment of making a crucial decision about the further project execution, the following decisions can be made by an investor: hold on the option execution (continue the investment) or abandon the investment.

Table 3. Decision-making process support

Node	Intrinsic value	Total value	Decision to be made	Time period
A	0	7	continue investment	t=0
B	0	0	abandon investment	t=1
C	0	11	continue investment	
D	0	0	abandon investment	t=2
E	0	0	abandon investment	
F	6	19	continue investment	
G	0	0	abandon investment	t=3
H	0	0	abandon investment	
I	0	0	abandon investment	
J	32	32	continue investment	

Source: own study

A number of possible investment decisions, which are the result of intrinsic and total values of the exit option comparison, is presented in Table 3. In the current year of project implementation for nodes C, F and J, the best possible decision is to continue the investment. An exit from the project is recommended in all the remaining nodes.

The value of the office real estate investment project was estimated at PLN 185,000,000 using the common methods. The value of the exit option, i.e. flexibility value at the time $t = 0$, is PLN 6,780,525. Real options evaluation assumes that the value of the investment goes beyond its value estimated by the classical discounted cash flow (DCF) or the NPV (project value is supplemented by the value of its options) (Larrabee & Voss 2012). It can therefore be concluded that, in a dynamic setting, the total value of the investment project is PLN 191,780,555 with the current recommendation for the investor to continue the project.

Real options take advantage of the opportunity to delay an investment decision until more information is available (Anderson, 2014). The decisions are often made based on factors that vary stochastically. The selected case of calculating the exit option value shows the supporting of decision-making process in a changing environment. Exit options grant managers the flexibility to terminate further investment and to recover some salvage value (Larrabee & Voss 2012). In addition, the analysis carried out confirms that it is necessary to use dynamic evaluation methods in conditions of a turbulent environment.

Literature research have shown that the available traditional methods of real estate evaluation fail to take into account the rate of sustainability. The concept of real estate sustainability can be found in the United Nations Environment Program, which states that green building is, in practice, creating structures and using processes that are environmentally responsible and resource-efficient in the entire building lifecycle, i.e. design, construction, current utilization, current maintenance, renovation, and finally, deconstruction (EPA, 2019; Wilkinson, Remøy & Langston 2014). This approach expands and complements the traditional aspects of design in terms of finance, usability, durability and an overall comfort of the building. A similar definition is quoted by Jones Lang LaSalle analysts, where sustainability is understood as a way of presenting social, economic and environmental factors in the life cycle of a building including design, construction, current utilization and future use (Jones Lang LaSalle IP, Inc., 2019). Green construction can be described as socially, economically, technically and biophysically sustainable (Hill & Bowen, 1997).

There is a growing understanding of the idea of incorporating sustainability criteria into the field of project management, as well as developing approaches, methods, tools and techniques that take this into account (Dobrovolskienė & Tamošiūnienė, 2016) as well as into project evaluation. The relationship between

sustainability and project management is becoming increasingly important and picking up momentum (Silvius & Tharp, 2013).

Developing the comprehensive real estate ongoing evaluation method, special attention should be paid to aspects of qualitative analysis. In the process of selecting qualitative factors, individual in-depth interviews (IDI) were carried out among business representatives who conduct activities related to servicing the real estate market with foreign capital, with the head office in Mazovia Province, Poland. Due to the strategic location of Warsaw (the capital city of Poland) in this province, it is the most developed investment region in Poland.

Table 4. The impact of commercial real estate sustainability on its value

Expert ID	Does sustainability increase the value of investments?
1	Yes – a per mille influence
2	Yes – it is hard to estimate, but definitely it is an added value
3	Yes – it is hard to estimate
4	Yes – it is hard to estimate, there is no research in this area
5	Yes – it is hard to estimate
6	Yes – it is hard to estimate
7	Yes – the increase in value is proportional to the scale of cost reduction resulting from the use of sustainable solutions
8	Yes – it is hard to estimate
9	No
10	Yes – the value increases up to 50% in comparison to the real estate without sustainability characteristics
11	Yes – it is hard to estimate, there is no research available
12	Yes – it is hard to estimate
13	No
14	Yes – it is hard to estimate
15	Yes – it is hard to estimate
16	Yes – it is hard to estimate
17	Yes – it is hard to estimate
18	Yes – it is hard to estimate
19	Yes – it is hard to estimate

Source: own study

The research covered 19 enterprises whose activity consists in investing in commercial real estate (10 enterprises), advising in the planning and implementation of investment projects in the commercial real estate sector (6 enterprises) and developing investment projects in the commercial real estate sector (3 enterprises). The legitimacy of introducing a real estate sustainability factor to the method of the ongoing investment project evaluation as a qualitative supplement was examined. When asked whether this factor affects the value of commercial real estate, 17 experts (89.5% of respondents) answered affirmatively, which supports the consideration of this aspect in the calculation process related to the investment projects value estimation. The sustainability impact on the real estate value was also examined. Respondents clearly stated that real estate sustainability is an added value, however, they could not precisely determine the value's increment (Table 4).

Therefore, to identify the impact of the sustainability factor on the investment project value, the proposed methodology presumes own classification of real estate depending on sustainability level and impact on the investment decision related to its further implementation. The list of real estate classes in the quality analysis is presented in Table 5.

Table 5. Real estate classes in terms of sustainability

Real estate class	Impact on project quantitative evaluation	Investment decision support
0	Negative	Exit
1	Slight	No recommendation
2	Positive	Continue
3	Very favorable	Definitely continue

Source: own study

Class 0 is a real estate that has not been subjected to the certification process, and therefore its sustainability rate cannot be determined. It is uncompetitive in relation to the other investment projects and may favor the decision to abandon the project.

Class 1 is a real estate with a slight degree of sustainability confirmed by a certificate of the lowest level, such as *pass* in BREEAM or *certified* in LEED (or another lowest rating in different certification systems). It is weakly competitive because it does not meet a number of sustainability requirements. In this case, there is no recommendation regarding the direction of further proceedings with the investment project since the identified sustainability features are not significant enough to affect its value.

Class 2 implies a confirmed positive degree of real estate sustainability, which means that it is competitive in this area. It can get a higher certification than the one achieved by the real estate at the basic level, but still not the highest, i.e. *good* and *very good* in BREEAM or *silver* and *gold* in LEED. In this case, it is recommended to continue the project.

Class 3 means that real estate has a definitely advantageous sustainability rating, confirmed in the certification process by obtaining the highest possible rate, such as *outstanding* in BREEAM or *platinum* in LEED. In this case, it is strongly recommended to continue that project.

It should be mentioned that supporting decisions by determining the degree of sustainability in the overall project evaluation is of secondary importance and therefore it cannot negate the decision resulting from the analysis with the use of real options – it can only strengthen or weaken it. Some believe, however, that probably in the near future, due to market requirements for financial terms of lease, the following elements for buildings will be identified: *pass*, *excellent* or *outstanding* (Shapiro, Mackmin & Sams, 2013). The results of individual IDI do not point to the existence of another qualitative factor that should be included in the modern integrated evaluation method and which would have a noticeable impact on the value of investment projects.

The heterogeneity of the real estate market, its lack of centralization, and the scarcity of market information make valuation a complex and difficult process that often gives imprecise results and in which the use of common methods does not really solve the problem. Studies show that real estate appraisers operating in the same market can make valuations that trigger a wide range of prices to be achieved (Myers, 1977). The development of a method based on common valuation methods but supplemented with the ROM and taking into account the real estate sustainability factor, is necessary to ensure a reliable evaluation of investment projects in today's changing world. As part of the proposed integrated method of real estate evaluation, a sequence of actions can be outlined, based on the combination of common real estate valuation methods, the ROM, and the sustainability aspect for the implementation of the real estate investment projects evaluation.

Five stages of the integrated evaluation method can be found below.

1. Structuring the evaluation process

In this stage, the ongoing assumptions and objectives of evaluation (for the sequence of actions to be initiated) are mainly formulated, preliminary data is prepared, and the issues related to calculations made in subsequent stages are sorted out.

2. Determining the initial value and viability of the project

The second stage is carried out using common methods of real estate valuation. This evaluation is preliminary and constitutes a starting point for further estimation of the value of the investment project.

3. Modifying the underlying asset value and adjusting the viability of the project

Activities carried out in this stage are to complement the initial estimate of the previous action by taking into account project flexibility. This parameter is taken into account as a result of using the ROM (in this case the exit option), which means introducing the necessary adjustment of the project value and providing a recommendation supporting the key managerial decision regarding the continuation of the project.

4. Determining the final value and viability of the project

In the fourth stage, the basic calculations terminate in order to determine final results. The qualitative factor is taken into account in the form of investment project sustainability. This factor cannot change a decision about further implementation or abandonment of the project but is either a confirmation or a negation of the legitimacy of recommendations resulting from the use of the ROM.

5. Summarizing the evaluation process

This summary may take the form of an evaluation report, which will allow access to knowledge and investment recommendations resulting from the current implementations.

Stages 2-4 show the ROM and sustainability integration within the real estate evaluation (Figure 4).

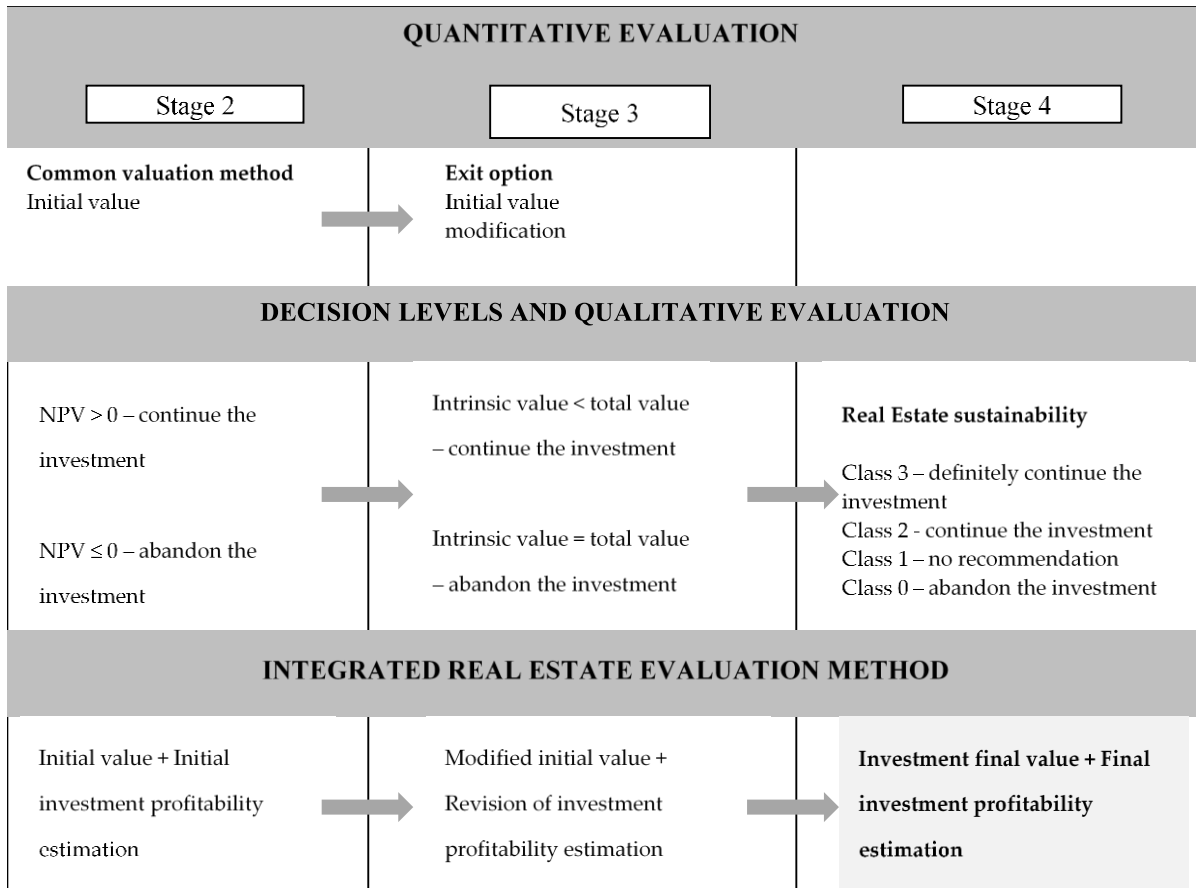


Fig. 4. The ROM and sustainability integration within the real estate evaluation method – stage 2-4

Source: Waszkiewicz 2016

Thanks to the new integrated evaluation method, the results will present a quota amount along with the direction of the adjustment of the value obtained and with the corresponding recommendation.

4. Research Results and Interpretation

The verification of the proposed integrated method of real estate evaluation was carried out in case studies developed on the basis of the actual data from the investment projects carried out by companies investing in commercial real estate, which participated in the IDI characterized in the previous section of this paper. Practical implementation of the developed method was carried out, making it possible to collect data and carry out a comparative analysis (Table 6).

Table 6. Characteristics of selected investments

	INVESTMENT 1	INVESTMENT 2	INVESTMENT 3
Function	Shopping center	Office real estate	Office real estate
Net internal area	90,000 sqm.	41,000 sqm.	16,300 sqm.
Real estate class	A	A	A
Certification type	BREEAM	BREEAM	LEED
Rating	very good	very good	platinum
Real estate class (own classification)	2	2	3
Other information	1,050 parking spaces, location in the city center, coverage of 1,795,000 people, examples of sustainable solutions: individual air-conditioning control, R410 refrigerant; six streams of waste segregation (glass, plastic, paper, used lighting, batteries and biological waste); basin faucets with reduced waterflow (4.5 l/min); gray and rainwater system; flexible light control system (LED lighting).	800 parking spaces, location in the city center, examples of sustainable solutions: low-carbon technologies; solar control and individually controlled blinds; leak detectors to prevent waterloss.	148 parking spaces, location in the city center, examples of sustainable solutions: geothermal cooling and heating system; photovoltaic panels on the roof of the building; gray and rainwater system; LED lighting adapting to the intensity of light coming from outside the building; parking spaces for charging electric cars.

Source: own study based on data obtained from enterprises investing in commercial real estate

The accuracy of the proposed method can be determined by comparing the results of the evaluation with the market prices of the real estate concerned. Thus, the following equation can be used for this purpose:

$$Tr_{zm} = \frac{W_{zm}}{W_r}, \quad (10)$$

where:

W_{zm} – result determined using integrated evaluation method,

W_r - real estate market value,

Tr_{zm} - accuracy of the new real estate evaluation method.

Similarly, the following equations can be formulated, which are helpful in the evaluation process followed by the common valuation method and the ROM:

$$Tr_{mk} = \frac{W_{mk}}{W_r}, \quad (11)$$

$$Tr_{mo} = \frac{W_{mo}}{W_r}, \quad (12)$$

where:

W_{mk} – result determined using the common real estate valuation method,

W_{mo} - result determined using the ROM,

Tr_{mk} - accuracy of the common real estate valuation method,

Tr_{mo} - accuracy of the ROM.

In the case of the first of the analyzed investment projects, the evaluation result using the integrated evaluation method consists of the information on the current value of the real estate (EUR 191.78 million) and takes into account the project's flexibility. In addition, the result indicates that this value should be adjusted upwards due to the sustainability features of the investment project. The recommendation indicates that for a given moment ($t = 0$) the continuation of the project is economically justified. Data for this project, obtained from one of the experts participating in the individual in-depth interview, shows that the investor was offered to buy the investment after it started. After the negotiation stage, the transaction amount was set at EUR 200 million. It turned out that the transaction did not materialize, and the investor decided to finalize the construction. Eventually, the property was sold for EUR 290 million two years after being put into use. These data indicate that the current value of the investment project determined by using the integrated evaluation method was more accurate than the valuation provided by common methods. In addition, the investor received a satisfactory amount of EUR 290 million intuitively implementing the indication in line with the assessment. It means that the accuracy of the integrated evaluation method in this case was 95.89%.

The current value of the second analyzed investment project was evaluated using the integrated evaluation method at EUR 159.94 million. According to calculations, this result should be corrected upwards due to the sustainability features of the project. At the moment of analysis $t = 0$, the recommendation was to continue. Also, in this case, the investor considered the decision to sell the initiated project, with the preliminary negotiations ended at EUR 165 million (the elements that have contributed to a value higher than the common methods valuation or the integrated evaluation method are unknown). The transaction ultimately did not materialize - the investor, despite transient problems with the continuation of the investment project, completed the construction of the property. One year after it was put into use, the property changed the owner and the transaction amount reached EUR 226.05 million. These data indicate that determining the current value of real estate using the integrated evaluation method is closer to the market price (accuracy of the proposed method is 96.93% compared to the accuracy achieved with the valuation made using common methods amounting to 90.91%). What is more, the result of the assessment indicates the need to correct this value upwards and shows that it is economically justified to continue the project.

The last analyzed investment project was evaluated using the integrated evaluation method at EUR 64.07 million. The result of the calculations is an indication (supported by the sustainability characteristics of the project) of increasing this amount at the analyzed moment ($t = 0$). It is highly recommended to continue the investment project. In this case, however, the investor decided to sell the project that had not yet been completed. The final transaction amount was EUR 94.5 million. As in the previous case, the reasons for the significant increase in the market value of this project are unknown. It can be concluded that this was mainly due to the flagship 'green' strategy of the investment project implementation using a variety of solutions with the highest degree of sustainability. An expert who worked on the implementation of this investment project stated that even at the design stage of the facility, it was decided to implement highly energy-efficient solutions that were supposed to bring real benefits in the phase of its operation. In addition, the investor originally assumed the real estate would be used only for their own purposes (as a headquarters of their company), which is why a great care for the quality of construction materials and the use of innovative technologies could be observed. Also, in this case, the accuracy of the integrated evaluation method is better than the value resulting from the valuation using common methods (67.80% compared to 55.03%).

Table 7 presents a summary of the most important results of studies on the validity of the new evaluation method and the results of the implemented method verification.

Table 7. Results of the research on the new method of real estate investment projects evaluation

	Value determined by common valuation method	Value determined by the ROM	Evaluation results using new method	Real estate market value	Accuracy of common valuation method	Accuracy of new method
Investment 1	W_{mk1} = EUR 185 million	W_{mo1} = EUR 191,78 million	W_{zm1} = EUR 191,78 million, including upward value adjustment and recommendation to continue	W_{r1} = EUR 200 million	Tr_{mk1} = 92,50%	Tr_{zm1} = 95,89%
Investment 2	W_{mk2} = EUR 150 million	W_{mo2} = EUR 159,94 million	W_{zm2} = EUR 159,94 million, including upward value adjustment and recommendation to continue	W_{r2} = EUR 165 million	Tr_{mk2} = 90,91%	Tr_{zm2} = 96,93%
Investment 3	W_{mk3} = EUR 52 million	W_{mo3} = EUR 64,07 million	W_{zm3} = EUR 64,07 million, including upward value adjustment and strong recommendation to continue	W_{r3} = EUR 94,5 million	Tr_{mk3} = 55,03%	Tr_{zm3} = 67,80%

Source: own study

where:

$W_{mk1,...,n}$ - value of investment “n” determined by the traditional method,

$W_{zm1,...,n}$ - value of investment “n” determined by the new method,

$W_{r1,...,n}$ - market value of investment “n”,

n – number of cases analyzed (n=3),

where real estate market value equals to real estate market selling price.

Accuracy of the calculations made using the new integrated evaluation method is contained mainly in its quantitative dimension. The arithmetic mean of the accuracy of the common methods for the analyzed cases was 79.48%, while the arithmetic mean accuracy of the results obtained using the integrated evaluation method was 86.87%. The financial dimension of improving viability of the proposed method is presented in Table 8.

Table 8. The financial dimension of improved viability of the new evaluation method

	Real estate market value	Accuracy of the traditional method	Accuracy of the new method	Adjustment of the new method evaluation result
Investment 1	W _{r1} = EUR 200 million	Tr _{mk1} = 92,5%	Tr _{zm1} = 95,89%	+ EUR 6,78 million
Investment 2	W _{r2} = EUR 165 million	Tr _{mk2} = 90,91%	Tr _{zm2} = 96,93%	+ EUR 9,94 million
Investment 3	W _{r3} = EUR 94,5 million	Tr _{mk3} = 55,03%	Tr _{zm3} = 67,80%	+ EUR 12,07 million

Source: own study

The conducted case studies have confirmed that the new integrated evaluation method allows more accurate determination of real estate values in comparison with the other methods analyzed.

5. Conclusions

The ROM uses the NPV method and, similarly to the DTA, it accounts for many development scenarios. The undoubted advantage of this method is that it additionally takes into account the flexibility of the investment project, which allows the project to adapt to changes occurring in its environment. It also helps support the making of decisions on how to proceed with the project by providing ongoing recommendations derived from the implementation of the ROM and the real estate sustainability factor. In literature the high potential of evaluation tools using the ROM is often emphasized (Schulmerich, 2010). However, this solution might not be enough to evaluate highly complex real estate investment projects. Therefore, integrating a higher number of methods is justified.

The ROM allows for adjusting the results obtained based on the DCF analysis (often unadjusted) and accounting for additional benefits and advantages that are hard to measure (Myers, 1977). It should be noted, however, that this estimation takes place in a limited, quantitative range. Furthermore, considering the ROM, it is assumed that during the intrinsic value of the exit option calculation, the benefits from the liquidation of the project are constant, which is not reflected in real life. As work progresses, the benefits of liquidation usually increase. The method of evaluation of the initiated investment project should take into account the actual state of the works performed and their contribution to the potential liquidation value. It is therefore necessary to continue the research on the usefulness of this interesting and increasingly popular quantitative method in the process of evaluation of various types of investment projects.

The proposed new method of investment projects evaluation does not undermine the achievements of other evaluation methods. On the contrary, it complements them with elements important from the point of view of the accuracy of evaluation. The ROM accounts for the right of the decision-maker to change the previously made decision, which becomes necessary when executing investment projects in a turbulent environment. Evaluation of investment projects using real options comes with many benefits, which is particularly evident comparing this method with the common methods based on the determination of the NPV and the calculation of the DCF. It provides greater opportunities for evaluation of strategic investment projects, also because it indicates real alternatives to proceed with the projects that are being implemented. Using real options enables to comprehensively evaluate an investment project, including both its initial value (which is the result of the passive management of an investment project) and the premium resulting from the implementation of options (resulting from the active project management) (Borison, 2001).

The need to take into account the sustainability factor in real estate evaluation has been proved. Future findings should focus on the quantitative impact of sustainability on the real estate value. Putting forward a new, multifaceted method of evaluation with a greater accuracy than the methods currently used may contribute to the development of basic research in the management sciences on innovative evaluation methods of real estate investment projects. A dynamic and integrated method is an important complement to the existing methods, while the results of this research may provide the basis for extending the scope of applications of the integrated evaluation method to other types of investment projects in the future.

The integrated evaluation method can serve as a significant support tool for company managers who invest in this sector, make important managerial decisions, and consequently require support throughout this process. It also allows to maintain flexibility in the decision-making process for long-term investments, plus it offers three-level recommendations that are more advanced than those derived from the NPV only. It can also be useful for companies carrying out investments (in particular for project managers as well as consultancy departments) as far as commercial real estate investments are concerned. After introducing the right modifications, the proposed method can provide support for financial institutions (investment funds, banks, etc.), and consequently set a new direction for further research.

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Tadeusz A. GRZESZCZYK, PhD is the Associated Professor at Warsaw University of Technology, Faculty of Management. His interests and research work include project management and evaluation, sustainability in project management the use of AI methods in project evaluation systems and decision support in management.

ORCID ID: orcid.org/0000-0002-4898-1931

Malgorzata WASZKIEWICZ, PhD is the Assistant Professor at Warsaw University of Technology, Faculty of Management. Her research interests are: project management, evaluation of investment projects, property management and design thinking.

ORCID ID: orcid.org/0000-0002-6758-7104

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DEBT MANAGEMENT EVALUATION THROUGH SUPPORT VECTOR MACHINES: ON THE EXAMPLE OF ITALY AND GREECE

Andrey Zahariev ¹, Mikhail Zveryakov ², Stoyan Prodanov ³, Galina Zaharieva ⁴, Petko Angelov ⁵,
Silvia Zarkova ⁶, Mariana Petrova ^{7*}

^{1,3,4,5,6} D. A. Tsenov Academy of Economics, Em. Chakarov 2 Str., 5250 Svishtov, Bulgaria

² Odessa National Economic University, Preobrajenska Str. 8, 65082 Odessa, Ukraine

⁷ St. Cyril and St. Methodius University of Veliko Tarnovo, T. Tarnovski 2 Str, 5000 Veliko Tarnovo, Bulgaria

E-mails: ¹a.zahariev@uni-svishtov.bg, ²mail@oneu.edu.ua, ³s.prodanov@uni-svishtov.bg

⁴g.zaharieva@uni-svishtov.bg, ⁵p.angelov@uni-svishtov.bg, ⁶silviazarkova1@gmail.com, ^{7*}m.petrova@ts.uni-vt.bg

(Corresponding author)

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Abstract. The focus of this research paper is on sovereign debt management evaluation. During the first decade of the 21st century, the PIIGS countries in the EU28 were the main generator of risks in the public finance sector, thus creating a threat for cross-border economic shocks. In 2018, Greece and Italy had the worst debt-to-GDP ratios and were earmarked as a benchmark for countries with sovereign debt problems. Greece is an example of a country with a non-systematic risk for the EU due to its low share of EU28's GDP of 1.16% (as of 2018) despite its record debt ratio of 176%. However, Italy is not only among the top 4 EU28 economies with a share of its national GDP in that of the EU28 of 11.1%, but also has a record debt ratio of 131%, which is significant for one of the top economies in the EU28 group. In view of the above, the paper is structured into three main sections. Section One presents an analysis of the efficiency of sovereign debt management as a key element of public finance management in the 28 EU Member States. Section Two presents a justification of the use of the Support Vector Machines (SVM) method for econometric analysis of macroeconomic data. Section Three presents groups and empirically tested internal and external indicators that affect the debt ratio of Italy and Greece. The analysis was conducted with quarterly time series of data for the period 2000-2018 using support vector regression (SVR) for sovereign debt testing calculated using software for interactive and functional programming - Python. The test results and their vector distribution in terms of SVR are presented as histograms. The main conclusion is that both for Greece and for Italy, there is a strong correlation between the SVM support vectors obtained through the algorithm, which is also due of the strict selection of indicators whose correlation is reformatted by the model algorithm, limiting its negative significance on the final result.

Keywords: Support Vector Machines (SVM); support vector regression (SVR); public debt to GDP ratio; Debt management

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1. Introduction

Public finance management in the EU28 is the means for allocating financial resources for implementing of the various policies of the Union based on a budgetary framework of financial relationships between net donor countries and net beneficiary countries. Despite the prioritization of macroeconomic indicators as criteria for Eurozone membership, there are some significant deviations from perhaps the most important indicator for efficiency of the national financial systems - the ratio of public debt to GDP. In 2018, Greece and Italy had the worst debt-to-GDP ratios and were earmarked as a benchmark for countries with sovereign debt problems. Greece is an example of a country with a non-systematic risk for the EU due to its low share of EU28's GDP of 1.16% (as of 2018) despite its record debt ratio of 176%. However, Italy is not only among the top 4 EU28 economies with a share of its national GDP in that of the EU28 of 11.1%, but also has a record debt ratio of 131%, which is significant for one of the top economies in the EU28 group. These facts determine the relevance of this study, which seeks to appraise and justify a technique for public debt management assessment based on the public debt-to-GDP ratio through factor regression using the Support Vector Machines (SVM) method. In view of the above, the paper is structured into three main sections. Section One presents an analysis of the efficiency of sovereign debt management as a key element of public finance management in the 28 EU Member States. Section Two presents a justification of the use of the Support Vector Machines (SVM) method for econometric analysis of macroeconomic data. Section Three presents groups of empirically tested internal and external indicators that affect the debt ratio of Italy and Greece. The analysis was conducted with quarterly time series of data for the period 2000-2018 using support vector regression (SVR) for sovereign debt testing calculated using software for interactive and functional programming - Python.

2. Sovereign debt and deficit financing – theoretical and practical aspects

National governments are major borrowers on both the domestic and international capital markets. On the other hand, government debt securities often constitute significant shares of institutional and individual investment portfolios. The techniques for financing government budget deficits has a strong influence on the structure and operation of the national financial markets. This influence is twofold, since any increase of the sovereign debt is a logical consequence of deficit financing decisions and, conversely, a budget surplus would allow the government to reduce the sovereign debt through active (advance repurchase of securities) or passive (redeeming callable bonds) measures. The second scenario definitely requires an assessment due to the direct relation between the regulatory requirements for the structure of the institutional investment portfolios and the availability of a sufficient number of debt securities with high credit ratings that meet the regulatory requirements. Government debt securities are therefore subject to long-term investment interest (Posner, 1999) and declines of the amount of government securities as well as shifts in their composition affect the interests of various public and private investors, such as commercial banks, insurance companies, pension funds, and the central banks of countries with a currency board. The importance of public debt management is also due to the significant and long-term consequences from debt management decisions of sovereign governments and their policy (Holcombe & Mills, 1995). This area of competence requires not only technical knowledge of the initial public offering of government securities, but most of all a thorough knowledge of the laws of macroeconomic equilibrium and the regulatory requirements for the investment portfolios of all other economic agents. For the purposes of this study, the authors have assumed that public debt management is a system of statutory activities of the Ministry of Finance in the field of initial public offering, secondary trading and redeeming callable bonds, incl. servicing of interest coupons according to ex ante deadlines. Efficient public debt management means not only to cover the government's spending needs, but also to achieve goals and meet the regulatory requirement of the national and the Community law (*acquis communautaire*). The achievement of the primary objective of public debt management relates to two groups of additional objectives, conditionally designated as technical and sectoral objectives of debt management. The first group includes objectives related to minimization of government debt service costs,

mitigation of debt management risks, minimization of the market impact on government debt operations, optimization of the maturity structure of the debt, optimization of the currency structure of the debt, establishment of an efficient system of primary dealers, etc. The second group is usually associated with the government policies on individual functions and responsibilities, such as provision of public goods with sufficient quantity and quality (Zahariev, 2012).

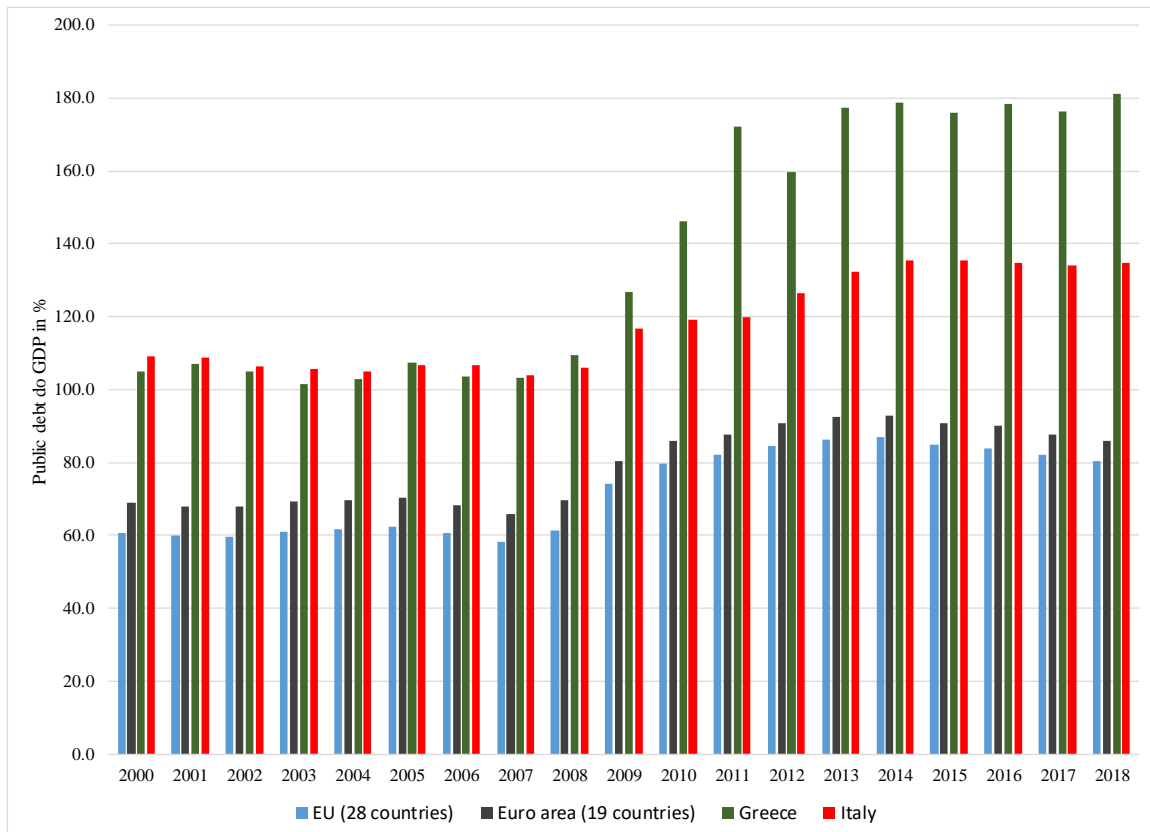


Figure 1. Public debt to GDP ratio of Italy, Greece and EU (2000 – 2018)

Source: compiled by the authors based on information from Eurostat

Any increase of a central government's budget deficit requires specific decisions on what debt securities should be issued and in what currency, at what interest rate, for what period, and whether the IPO should be discount or premium-based. Regardless of the requirements and expectations of institutional investors in government securities, the macroeconomic framework and the medium-term prospects for the economic development of the country are equally important for the Ministry of Finance in terms of sovereign debt management. According to the Maastricht criteria for Eurozone membership, there is direct correlation between the criteria for the maximum debt level, central budget deficit, and long-term convergence interest rates that can dramatically upset the balance between budget revenues and budget expenditures when decisions are made to revolve government budget deficits and there is demand for increasing risk premiums from the primary dealers. In such circumstances, the interest burden on the existing debt can result in long-term destabilization of the economy (Zahariev, 2000) and block the phases of the debt cycle, equalizing the absorption of the economy with the income generated at a certain interest rate levels on the outstanding debt. Such a debt crisis situation occurred in Greece in 2010, when for a period of only two years the country's debt ratio boomed from 109% (in 2008) to 172% (in 2011) and continued to increase to reach 181% in 2018. A similar situation was observed in Italy (see Figure 1), where the pre-crisis debt ratio of 106% increased to 135% from 2014 through 2018 compared to EU28 average of 80.4%

and Euro Area 19 average of 86% in 2018 The inability of the two countries to reduce their sovereign debt shows that the reforms undertaken by their governments can only maintain the debt ratio at a stable level, thus hindering the growth of their economies by reducing the GDP with the amount of the redeemed callable debt, which is usually revolved by issuing new debt securities. It is therefore important to study the dynamics of the debt ratio with econometric analysis technology that takes into account multiple factors in order to establish statistically significant regression dependence for Italy and Greece.

3. The Support Vector Machines (SVMs) technology as a tool for digital econometric analysis of macroeconomic data

Commonly known as a "black box" technology, the **Support Vector Machines (SVMs)** are generally supervised machine learning models with associated learning algorithms. SVMs are based on a large set of complex mathematical calculations. SVM software is written in some of the popular programming languages, incl. "R", "Python", "Eviews", "Matlab", etc. The support-vector clustering algorithm is a relatively new approach developed by Professor Siegelmann (Dr. Hava Siegelmann, 2019), a world leader in the field of machine learning and the University of Colombia's professor of computer science and statistics Vladimir Vapnik (Vapnik, Vladimir, 2019.) It applies the statistics of support vectors, developed in the support vector machines algorithm, to categorize unlabeled data and can be used both to the analysis of the relationship between large amounts of statistical data and to classification and regression analyses. SVMs are based on supervised machine learning methods that analyse the data and identify the models. They construct a hyperplane or set of hyperplanes in a high- or infinite-dimensional space, which can be used for classification, regression, or other tasks.

SVMs are largely reduced to choosing a kernel and a support vector machine. The method (Boser, Guyon, & Vapnik, 1992) generally works based on finding an oriented hyperplane that maximizes the closest distance between observations while minimizing the amount of error in the experiments performed. An SVM model (Ben-Hur, Horn, Siegelmann, & Vapnik, 2001) is a representation of the examples as points in space, mapped so that the examples of the separate categories are divided by a clear gap that is as wide as possible from the kernel. New examples are then mapped into that same space and predicted to belong to a category based on the side of the gap on which they fall. In this way, a better generalizability of the function obtained and the ability to interpret the regression results are achieved. The performance of an SVM depends largely on the choice of its parameters. Its estimation consists of a description of unknown dependencies in the observed data set. These dependencies may be linear or non-linear.

Like any other classification technique, SVM has its advantages and disadvantages, which are more or less important depending on the data being analysed and are thus relatively important. The advantages of the SVM technique are that it:

- guarantees optimal results;
- minimizes the error;
- is equally applicable for both linear and non-linear classifiers;
- is versatile in terms of format selection and model structure;

The main disadvantage of the SVM technique is the lack of transparency of results and requires bulky computations. Interpretation of results relies on graphical visualization of the score. An analysis of the graphs gives an important input about the direction towards which the score should be optimized.

The SVM technique is applicable to various types of data and for various purposes. It was used by many researchers, such as Marček and Marček (n.d), who used the technique to investigate the quantifying of statistical

structural model parameters of inflation in Slovak economy. They used dynamic and SVM modelling approaches and concluded that the Support Vector Regression (SVR) models deserve to be integrated in the range of methodologies used by data mining techniques, particularly for control applications or short-term forecasting where they can advantageously replace traditional techniques. The SVM technique was used by Nalbantov, Bioch, and Groenen (2005) to evaluate the dichotomous variable of interest and thus assess the effect of manipulating some marketing instruments on the probability of a certain choice between two alternatives. Grigoryan (2018) focuses on financial time series prediction problem. He proposes an integrated prediction model based on support vector machines (SVM) for stock market prediction of stocks traded on the Baltic Stock Exchange and the Bucharest Stock Exchange. The proposed prediction framework consists of two stages. In the first stage, the ICA technique is used to extract information from research data and then the SVM technique is applied to forecast the stock prices. Tay & Cao (2001) apply the neural network technique (SVM) to financial time series forecasting. They compare the SVM with a multi-layer back-propagation (BP) neural network. Their experiment proved that SVM outperforms the BP neural network based on the criteria of error and directional symmetry and proved that it is advantageous to apply SVMs to forecast financial time series. Panigrahi & Mantri (2014) performed a comparative analysis of the prediction efficiency of a Multi-Layer Perceptron (MLP) and Support Vector Machine (SVM) in the field of financial time series analysis considering the importance of economic growth, macroeconomic stability, and the minimization of the stock price volatility in India. Their study proved SVM as a better alternative to MLP for forecasting of non-stationary, non-linear and inherently chaotic financial time series. Divya & Agarwal (2011) used an enhanced SVM - Fuzzy Support Vector Machine“ (FSVM) - to classify 70 countries in terms of their macroeconomic variables. The result of their experiment shows that the used classifier has a good accuracy. Auria & Moro (2008) examined the SVM statistical technique as an alternative considered by the Deutsche Bundesbank for company rating. They pay special attention to the features of the SVM which provide a higher accuracy of company classification compared with more traditional approaches such as logistic regression and discriminant analysis with data of annual income statements and balance sheets of German companies. The out-of-sample accuracy tests confirm that the SVM outperforms both traditional techniques.

The above brief review of theoretical concepts and publications leads to the conclusion that SVMs outperform most of the other classification techniques because they provide a good out-of-sample generalization. When used for forecasting and cluster distribution, they minimize the error, which is an essential feature of the classification results.

Therefore, we can conclude that SVMs are an advanced technique for digital econometric analysis of time series. They deliver a unique solution for flexibility in the choice of the form of the threshold, good classification results in the case of non-regularity in the data, and minimization of the statistical error. These features were considered essential for our research on the problems and challenges of sovereign debt management of Greece and Italy, whose economies are important for the stability of the European economic and monetary union.

In statistical learning theory, the supervised “learning” of data, which underlies the SVMs, was defined by (Vapnik, 1998) as: We are given a set of training data (z_1, y_1) according to unknown probability distribution $P(z, y)$ and a loss function $V(y, f(z))$ that measures the error done when, for a given z , $f(z)$ is predicted instead of the actual value of y . The problem consists in finding a function f that minimizes the expectation of the error on, i.e. find a function that minimizes the expected error:

$$\int V(y, f(z)) P(z, y) dz dy$$

Since $P(z, y)$ is unknown, we need to use some induction principle to infer from the available training examples a function that minimizes the expected error, which is written as minimizing the empirical error:

$$\frac{1}{l} \sum_{i=1}^l V(y_i, f(x_i))$$

An important question is how close the empirical error of the solution is to the minimum of the expected error. A central result of the theory states the conditions under which the two errors are close to each other, and provides probabilistic bounds on the distance between empirical and expected errors.

The main feature of SVMs is that it finds the optimal hyperplane as a solution to the problem. The simplest SVM is linear, whereby the hyperplane lies on the input data space z . In this case, the hypothesis plane is a subset of all hyperplanes.

$$f(z) = w \cdot z + b$$

In their most general formulation, SVM find a hyperplane in a space different from that of the input data z . It is a hyperplane in a feature space induced by a kernel K , through which the hypothesis space is defined as a set of "hyperplanes" in the feature space induced by K . So, the hypothesis space used by SVM is a subset of the set of hyperplanes defined in some space written as: (Evgeniou & Pontil, 2001):

$$\{f: \|f\|_K^2 < \infty\}$$

where:

K is the kernel.

We have to distinguish between SVM classifiers and SVM regressors. For classification ideally the misclassification error needs to be minimized, so a loss function of the form $\text{sign}(-yf(z))$ should be used (in classification y takes binary values ± 1 , and classification is done by taking the sign of function $f(z)$). Because of scaling as well as computational reasons (Vapnik, 1998), the actual loss function used for SVM classification is:

$$|1 - yf(z)|, \text{ i.e. } 0 \text{ if } 1 - yf(z) < 0 \text{ and } 1 - yf(z) \geq 0.$$

This is also called the *soft margin* loss function. The margin is an important geometric quantity associated with SVM classification. For regression the loss function used is the so-called *epsilon-insensitive loss function*:

$$|y - f(z)|\epsilon, \text{ which is equal to } |y - f(z)| - \epsilon,$$

if $|y - f(z)| < \epsilon$, and 0 otherwise.

To summarize, SVM are learning machines that minimize the empirical error while taking into account the "complexity" of the hypothesis space used by also minimizing the kernel norm of the solution. SVM in practice minimize a trade-off between empirical error and complexity of hypothesis space. Formally this is done by solving the following minimization problems:

$$\begin{aligned} \min \|f\|_K^2 + C \sum_{i=1}^i |1 - y_i f(x_i)| \\ \text{for SVM classification, and} \\ \min \|f\|_K^2 + C \sum_{i=1}^i |1 - y_i f(x_i)|\epsilon \\ \text{for SVM regression (SVR),} \end{aligned}$$

where C is a so called "regularization parameter" that controls the trade-off between empirical error and complexity of the hypothesis space used.

SVRs must be adjusted for each particular application depending on the type of data, the approach used and the desired results. Many SVRs use unbalanced data and parameter optimization. Scaling data of independent variables is important for summarizing the results of parameter optimization. In this particular case, the SVR is used to model the relationship between the main subject of monitoring by the European institutions –

“government debt as a percentage of gross domestic product” (sovereign debt ratio) and the main factors that affect the ratio, which are components of indicators tracked by the financial institutions in the Euro Area. Subsequently, the model is used to distinguish the factors that have an adverse effect on the debt management of Italy and Greece. This presents, through a different approach, the challenges that governments need to address in order to improve the fiscal discipline in these countries and take preventative measures against the risk of volatility in the Euro Area. The SVR evaluation of government debt management was computed with an interactive and functional programming software written in Python.

4. SVR evaluation of the sovereign debt management of Italy and Greece in the period 2000 – 2018

The SVR model uses data for factors with direct and indirect effect on the debt management of Greece and Italy. Quarterly data for the period from 2000 to 2018 (a total of 76 observations of the indicators and the resulting ratios) are used, which have a low degree of correlation with government debt to gross domestic product ratio (*The use of the government debt to gross domestic product ratio as a target variable is due to the fact that this indicator is subject to statutory requirement for a fixed threshold limit of 60% and thus allows objective comparison of the two countries in terms of their sovereign debt*). The data was optimized to derive a total of indicators classified conventionally in two groups as internal and external indicators.

Internal indicators refer to the ratios of the main structural components of government debt to total government debt as follows: *currency and deposits to government debt* (*gg_curr_deposits_from_debt*); *debt securities to government debt* (*gg_debt_sec_from_debt*); *short-term debt securities to government debt* (*shortt_debt_sec_from_debt*); *long-term debt securities to government debt* (*longtt_debt_sec_from_debt*); *short-term debt securities to long-term debt securities* (*shortt_debt_sec_from_longtt_debt_sec*); *government loans to government debt* (*loans_debt*); *short-term loans to government debt* (*shortt_loans_from_debt*); *long-term loans to government debt* (*longtt_loans_from_debt*); *short-term loans to long-term loans* (*shortt_loans_from_longtt_loans*); *the amount of outstanding international debt securities to government debt* (*gg_int_outst_amount_from_debt*); *real effective exchange rate* (*real_eff_exch_rate*); *the amount of outstanding international debt securities due within one year to government debt* (*gg_1yr_amount_from_debt*).

External factors affect indirectly the measure of government debt to gross domestic product and are part of the statutory criteria for monitoring the financial stability of the EU member states by the monetary institutions of the EU. They include: *the exchange rate of the Euro to the USD* (*local_ccy_to_usd*); *consumer price index* (*cons_price_index*); *3-month (90-day) interbank interest rate* (*3m_int_rate*); *consumer price index change from the previous reporting period* (*cons_price_growth_index*); *exports to imports rate* (*export_import*); *government debt to active population (aged 25-54)* (*debt_active_population*); *government debt to working age population* (*debt_working_age_population*); *unemployment rate of the population aged 15-74* (*unempl_rate*); *net lending to GDP* (*net_lend_from_gdp*), *production of total industry* (*prod_of_total_industry*).

The data in the SVR model are trained using the parameters listed in Table 1 below.

Table 1. Training parameters in SVR

Parameter	Value	Parameter	Value
GREECE			
Coefficient	0.0	Gamma	0.0001
Degree	3	Max. Iteration	-1
Epsilon	1e-05	Model Score	0.9878092
ITALY			
Coefficient	0.0	Gamma	0.0001
Degree	3	Max. Iteration	-1
Epsilon	1e-05	Model Score	0.9901414

Source: compiled by the authors

The table clearly shows the statistical similarity between the two structured algorithms. The only difference between the models is the accuracy value (*model score*), which is significant for both countries. With values of 0.98780% for Greece and 0.99014% for Italy, the algorithm is used to determine the degree of influence of the selected indicators on the government debt to gross domestic product ratio of the two countries in the period 2000-2018.

The original and predicted data sets and vector distribution of the SVR results are presented graphically as histograms in Figure 2 below. The dots (original) represent the raw data and the stripes (predicted) represent the predicted values shown as vector functions and the relations thereby.

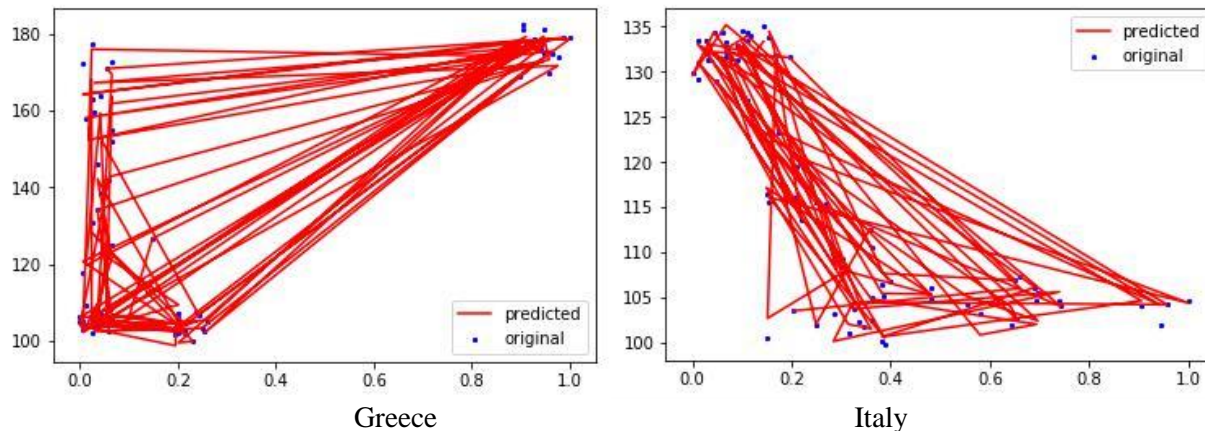


Figure 2. Vector histogram for the period 2000-2018.

Source: compiled by the authors

The histograms show a strong correlation between the support vectors obtained by the algorithm for both countries. This is due, on the one hand, to the rigorous selection of indicators whose correlation relationship is reformatted by the algorithm and its negative significance to the end result is limited.

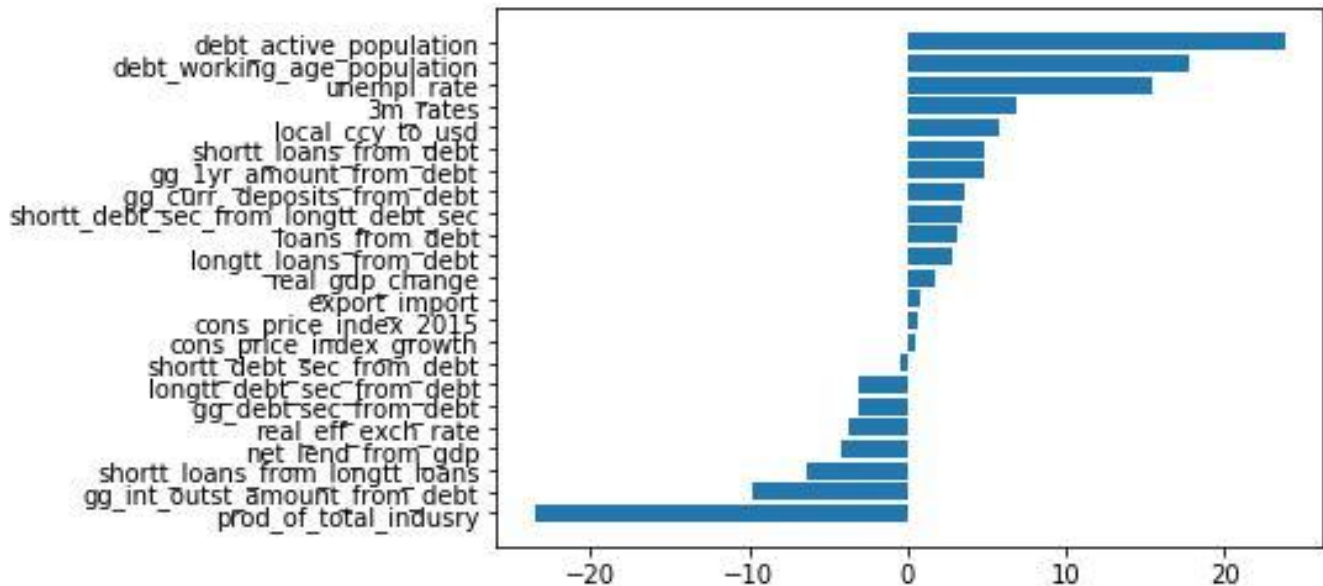
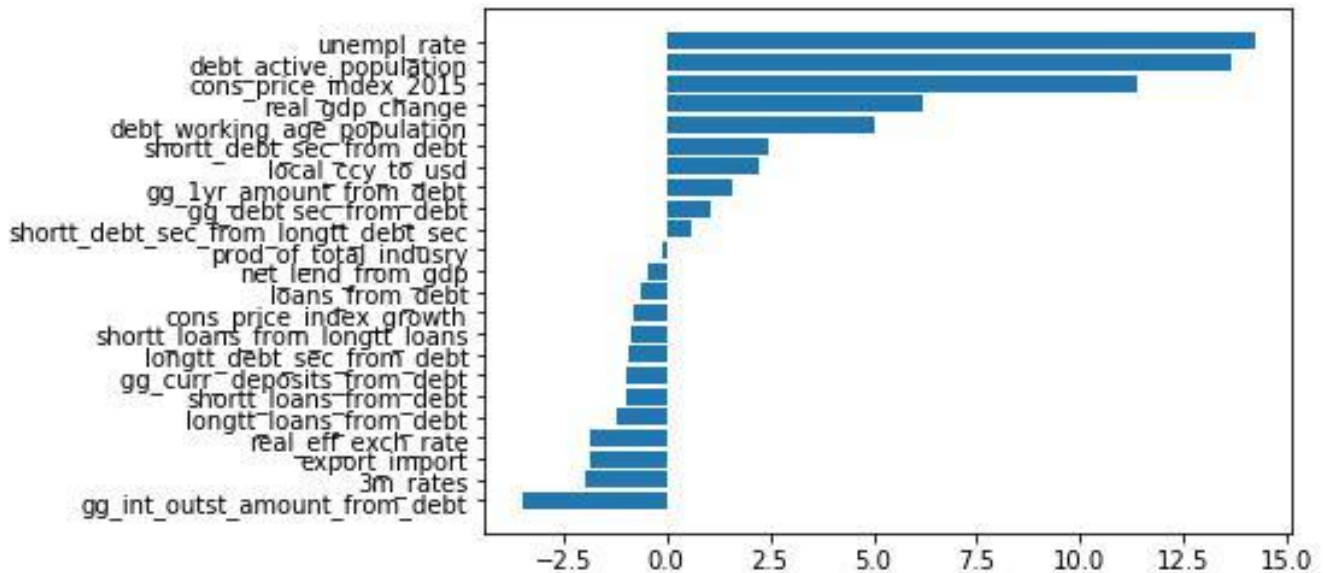


Figure 3. Profile of the degree and direction of influence of the factors on the target variable for Greece

Source: compiled by the authors



Фигура 4. Profile of the degree and direction of influence of the factors on the target variable for Italy

Source: compiled by the authors

The individual components of the aggregate indicators used in the EU do not indicate explicitly the fiscal implications of long-term and short-term government liabilities, nor do they identify the threats associated with sustainable sovereign indebtedness. On the other hand, European regulations do not have provisions for a “sudden cease” in the movement of capitals among the Euro Area Member States and the emergence of cross-border effects. The huge bail-out cost of the counter-cyclical fiscal policies undermine the creditworthiness of most Euro Area Member States, most notably of Greece and Italy.

The simple debt-related rule which states that the greater the sovereign debt, the greater is the risk of difficulties related to its management and servicing is especially obvious in the case of Greece and Italy. The level of sovereign debt ratio depends on the particular circumstances and the effects of various factors. The effect of the indicators on the target variable is graphically presented in Figure 3 for Greece and Figure 4 for Italy. In the case of Italy, 13 of the factors (of which 4 with high intensity) have a negative effect for the debt ratio (i.e. they decrease the target government debt-to-GDP ratio) and the remaining 9 factors (all of them with low intensity) have a positive effect. In the case of Greece, there are 14 factors with negative effect (among which 3 with high intensity) and 8 factors with a positive effect. The significance of each indicator in terms of the degree of its effect on the sovereign debt-to-GDP ratio evaluated using the SVR, shows that the “external” indicators have higher intensity than the “internal” ones. This, in turn, could contribute to finding an optimal solution to the sovereign debt problems experienced by Greece and Italy.

Conclusions

The application of the SVM method to model the dependence of the debt ratio of Italy and Greece on two groups of factors confirms the analytical and research utility of the method in two aspects. First, the technique proves that, both in Greece and Italy, there is a strong correlation between the support vectors obtained with the SVM algorithm, which is also due to the strict selection of indicators whose correlation is reformatted by the model algorithm to limit their negative significance for the final result. Secondly, the SVR test results and their vector distribution represented as histograms confirm that the correlation between the factor indicators and the debt ratio of Italy, whose economy is significant for the EU28, indicates that it has better chances to overcome its debt crisis. This is also due to Italy's highly diversified economy, which invariably generates over 10% of the GDP of EU28. Nevertheless, the governments of both countries will face many challenges, especially when the European Central Bank abandons its zero interest rate policy and sets a positive interest rate. Such a decision will inevitably increase the cost of servicing the sovereign debts of Italy and Greece and they will remain, at least for a while, the countries with the most critical levels of public debt-to-GDP ratio.

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Andrey ZAHARIEV, Professor of Finance and Chair of the Department of Finance and Credit at D. A. Tsenov Academy of Economics, Svishtov, Bulgaria. He is with a PhD degree in the field of the financial management of human resources and habilitation work in the field of public deficit and public debt. He is currently Editor-in-Chief of Economic Archive, leading Bulgarian scientific journal in the field of social science. Research interests: debt management; public finance; human capital investment; international finance; financial analysis; corporate capital management.

ORCID ID: <https://orcid.org/0000-0001-7362-6133>

Mikhail ZVERYAKOV, Professor, Doctor of economy science, Corresponding Member of the National Academy of Science of Ukraine, Rector of Odessa National Economic University, Academician of the Academy of Economic Cybernetics of Ukraine, Chairman of the Board of Directors for the Higher Education of the Odessa Region Research interest: methodology and theory of economic system development in the conditions of market transformation; research into the development of the institutional structure in transition economies.

ORCID ID: <https://orcid.org/0000-0003-0039-5068>

Stoyan PRODANOV, Associate Professor at Department of Finance and Credit at D. A. Tsenov Academy of Economics, Svishtov, Bulgaria. He is with a PhD degree in the field of capital budgeting. Research interest: general insurance; investment management; capital budgeting; cost-benefit analysis.

ORCID ID: <https://orcid.org/0000-0002-3657-6111>

Galina ZAHARIEVA, Associate Professor and Chair of the Department of Finance and Credit at D. A. Tsenov Academy of Economics, Svishtov, Bulgaria. She is with a PhD degree in the field of international price strategies. Research interest: international competitiveness; international economy; international human resource management; European business regulations; export specialization.

ORCID ID: <https://orcid.org/0000-0002-7178-2869>

Petko ANGELOV, Head Assistant Professor at Department of Finance and Credit at D. A. Tsenov Academy of Economics, Svishtov, Bulgaria. He is with a PhD degree in the field of the state debt and economic growth. Research interest: public finance; debt management; commercial banking.

ORCID ID: <https://orcid.org/0000-0001-9459-4812>

Silvia ZARKOVA, PhD student at Department of Finance and Credit at D. A. Tsenov Academy of Economics, Svishtov, Bulgaria. She is with double winning nominations as Young Economist of Bulgaria under the governance of the Union of the Economists of Bulgaria and a national winner as PhD Students of the year 2019 of Bulgaria under the governance of National representatives of Student Councils of Bulgaria. Research interest: debt management, financial modelling and analysis.

ORCID ID: <https://orcid.org/0000-0002-7429-9725>

Mariana PETROVA, Professor, D.Sc in Physics and Mathematics, assoc.prof. St. Cyril and St. Methodius University of Veliko Tarnovo, Bulgaria; Professor Economics and Management in Department of Management, ISMA University, Riga, Latvia. Research interests: management of IT processes, project and services, business administration, modern information systems and innovations, knowledge economy, sustainable development.

ORCID ID: <https://orcid.org/0000-0003-1531-4312>

Register for an ORCID ID:

<https://orcid.org/register>

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FINANCIAL DATA REPORTING ANALYSIS OF THE FACTORS INFLUENCING ON PROFITABILITY FOR INSURANCE COMPANIES

Alina Kulustayeva ¹, Aigul Jondelbayeva ², Azhar Nurmagambetova ³, Aliya Dossayeva ⁴,
Aliya Bikteubayeva ⁵

^{1,2} Narxoz University, Zhandosov st. 55, Almaty, Kazakhstan

³ Al-Farabi Kazakh National University, Al-Farabi ave.71, Almaty, Kazakhstan

^{4,5} Turan University, Republic of Kazakhstan, Almaty, Satpaeva Street 16-18, Almaty, Kazakhstan

E-mails: ¹ Mishell_a@mail.ru; ² k_aygul@mail.ru; ³ nazhar1977@gmail.com; ⁴ dosayeva@mail.ru; ⁵ vesenii@list.ru

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Abstract. In this article the econometric analysis of panel data for insurance companies of the Republic of Kazakhstan from with a research objective of financial figure for profitability and influencing of factors defining profitability was performed. The article reveals the indicators that affect the profitability of insurance companies in order to further forecast. Independent variables were calculated using information on insurance companies of the Republic of Kazakhstan available in the public domains, mainly data from financial statements. The author reaches to prove that the data on insurance companies' obligations exert special influence on the evaluation of the profitability of the insurance company. The article suggests a methodical approach to measuring financial indicators of insurance companies based on panel data models, taking into account industry and individual differences. The research is carried out using the Gretl software package. Panel data models with fixed effects, panel data models with random effects were applied, and the most effective model was selected by the Hausman Test. As a result, it is proved that the profitability of the insurance company is affected by three indicators, two of which are calculated on the financial statements, including the financial leverage. This allows us to use these indicators in further forecasting the profitability and financial stability of insurance companies. Correctness of the assessment of profitability and forecasts are influenced by the correctness of data in the financial statements. The quality of models is limited by the quality of the financial statements of companies analyzed in this article.

Keywords: insurance companies; profitability; profitability of insurance companies; analysis of insurance companies; panel data models with the fixed effects; panel data models with random effects; leverage; profitability forecast

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1. Introduction

In contrast to investment and the endowment funds which put the task just to keep the capital, insurance companies usually reach out for maximizing economic viability for covering future engagements. Furthermore, insurance companies are controlled process and must parallel fitness in accordance with the requirements of the regulator (Revinskiy, 2016). The most important focus of the government at insurance companies' regulation is aimed at their financial sustainability. This is the main indicator of the success of the insurance industry as a whole. While insurance is like any other businesses is aimed at making a profit. The presence of profit, that is profitability increases insurance company's stability (Pratheepan, 2014; Hilkevics, Semakina, 2019).

Achieving positive result of insurance company stands for strategic priorities in company's financial management. Research objective is the empirical analysis weight and degrees of a number of financial figures for forming profitability in homegrown insurance companies.

The econometric linear model of multivariate regression has been constructed for achieving this aim by means of Gretl software package, its specification is defined and the adequacy to the constructed model and the importance of parameters are checked. The panel data picking, rendering financial parameters of insurance companies of the Republic of Kazakhstan in seven years from 2012 to 2018 has been made. As regressors of model six variables - the size of firm, profitability of assets, possibilities for growth costing of the fixed production assets and the equipment, growth of total assets, not debt tax board and material assets are used. It is defined in the presented research that not all traditional determinants are significant when determining profitability for insurance companies of the Republic of Kazakhstan.

2. Research background

Majority of researches use profitability as a figure by insurance market performance. They can use it as a figure to show insurance company status (Long and Li, 2017 and Sharif et.al, 2012). Some use it as a resultative figure that means to investigate occurrences of its increase or forecasting activity (Akotey et al, 2013 and Sumaira and Amjad, 2013). Theoretically the size of profit depends only on two figures: income and expenses. However, these two figures in turn are exposed to influence by other figures of insurance companies and features of developed economy (Akotey et al, 2013, Buyinza et al., 2010 and Indranarain, 2009).mDu Jardin P. 2009 in his article analyzed figures that have been used to predict bankruptcy or distress of companies. His analysis was done on 190 papers. He found variables that better reflect companies' state. They could be divided into variables that reflect the situation in company (financial variables and variables that that represent such main characteristics as structure, strategy, management and others) and variables that shows the economic environment of the company. From 190 papers 93% used financial ratios, and 40% choose variables based on its popularity and predictive ability in previous studies. If we focus on the researches connected with insurance companies, then, the figures from the first group have been used as a close resource objectives by means connected directly with the companies. Among them there are financial figures and figures by their dynamics, and figures connected with company age. (Long and Li, 2017 Akotey et al, 2013, Sumaira and Amjad, 2013 and Sharif et.al, 2012). Badea research (2017) which investigates for 15 articles investigating insurance companies and their profitability is especially remarkable in this regard. 10 of 15 articles use as dependent variable defining company profitability by the return on assets. As independent variables in researches is often used financial leverage which is calculated on the basis of financial date reporting. Financial leverage and size of company are two most often used figures according to Badea research (2017).

We investigated also these articles and have come to a conclusion that in our case the most indicative is profitability not of assets, and profitability of sales as a profitability figure, that is we use a ratio of net profit to

net insurance premiums. We have taken some figures of financial data reporting as independent variables connected with obligations such as financial leverage and the current liquidity and have added figures of the size and age of insurance company. And on the basis of these data have decided to study extent of their influence on overall performance of insurance companies through their profitability. Thus if financial data reporting figures don't exert impact on profitability, then it will be possible to consider the fact of financial data reporting impact on efficiency is not proved. Whereas the return will be the proof of importance for these figures of insurance company profitability.

Of course, factors that affect the profitability of insurance companies are not limited to the information provided in the financial statements. There are a huge number of internal and external non-financial factors. Great impact on the activities of insurance companies can be provided by natural disasters that could cause the enormous economic and insured losses (Benali and Feki, 2017). But natural disasters are often unpredictable; therefore, within the framework of this article, we took into account the limited sources of information. Users need a system to assess the profitability and sustainability of insurance companies using data that is freely available. Therefore, the data presented in the public financial reports meet these requirements completely.

3. Review of the insurance market of the Republic of Kazakhstan

Development of the insurance sector stimulates business activity of a business function and also provides further expansion for insurance scope in the real sector of economy. In addition to the insurance sector stands for one of the internal funding sources for commercial banks for ensuring investment process in the real sector of economy. The tendency to develop requirements by increasing authorized capital is traced in process of developing homegrown insurance market. According to Agency Board Resolution of the Republic of Kazakhstan by-laws managing from August 22, 2008 No. 131 "About the approval of the Instruction for establishing prudential standards and other norms to regulatory compliance for the insurance (reinsurance) company and insurance group, including the minimum sizes of authorized capital, guarantee fund, a margin of solvency and terms of reports submission of implementing prudential standards" (further – the Instruction No. 131) requirements to forming authorized capital order and the minimum size of guarantee fund for insurance (the reinsurance organizations) and also the principles of requirements to solvency and financial stability for insurance companies are established. Many of these requirements have led to the reduction for number of insurance companies in Kazakhstan. As it is seen from table 1, insurance companies were 40 in 2012, was cut down to 32 in 2018 is presented by 3 insurance groups.

Table 1. Insurance Market Structure in the Republic of Kazakhstan

Insurance Market Structure	2012	2013	2014	2015	2016	2017	2018
The number of insurance organizations	40	38	35	34	34	33	32
<i>Those of life insurance</i>	7	7	7	7	7	7	7
The number of insurance brokers	13	14	13	14	15	15	15
The number of actuaries	70	85	82	72	71	61	59
The number of insurance organizations which are participants of AS 'Payout Guarantee Fund'	-	33	31	30	30	30	22
The number of insurance companies representatives – non resident of Kazakhstan	-	8	-	3	0	3	3

Source: compiled by authors according to Data of National Bank of the Republic of Kazakhstan, <http://www.nationalbank.kz>

Table 2 depicts the volume of insurance premiums from 2012 to 2018 is came to 1 717 533 billion tenge and the total volume of insurance benefits for analogical period is came to 380 878 million tenge. In general, the growth

of volume of insurance premiums is observed positively since 2012. For the analyzed period from 2012 to 2018 payout structure by classes of insurance was gradually changed. So, if earlier more than a half of payouts was to the fraction of property insurance, then in the last 3 years its fraction isn't up to 20%. The remained fraction in equal ones is distributed practically between obligatory and personal classes of insurance.

In obligatory insurance more than a half of payouts is attributable to (CRR) owners of vehicles, according to the Law of the Republic of Kazakhstan from July 1, 2003 No. 446- II about obligatory insurance of civil and right responsibility for owners of vehicles, and a quarter is to catastrophe insurance under labor (office) duties. In voluntary personal insurance the vast majority of payout is made under contracts of health insurance and retirement annuities.

Thus, the analysis of changing structure and growth dynamics of insurance premiums and payouts allows us to draw the further changes: the insurance sector of economy of the Republic of Kazakhstan during the period from 2010 to 2016 was at growth stage. At the same time the market developed on an extensive way, but we assume some stagnation for the market dealing with difficult macroeconomic conditions in the near mid-term. It remains heavy reliance of the insurance market of Kazakhstan on bank and material sectors of economy. However, it is necessity to note a tendency of the displaced development from corporate orientation towards retail business. If abstracting insurance market factors as wage rates, quality of living etc., then the following conclusion will be made. In general, despite considerable potential, the main subjective condition for demand forming for insurance products is the population trust to the financial markets itself, and to insurance in particular. Obviously, the homegrown insurance market should concentrate efforts to increase level of insurance literacy among the population and also to increase level of transparency among insurance companies.

Table 2. The Structure of Insurance Premiums and Insurance Benefits by classes of insurance (million tenge)

Classes of insurance	2014		2015		2016		2017		2018	
	Insurance Premiums	Insurance Benefits	Insurance Premiums	Insurance Benefits	Insurance Premiums	Insurance Benefits	Insurance Premiums	Insurance Benefits	Insurance Premiums	Insurance Benefits
Obligatory insurance, million tenge	48 679	16 168	61 293	19 988	66 176	26 556	73 096	25 482	90 633	27 673
Voluntary personal insurance, million tenge	85 155	39 991	94 692	22 805	81 304	25 681	82 971	30 608	86 456	30 216
Voluntary property insurance, million tenge	77 678	11 890	123 251	9 172	118 641	10 065	132 204	11 124	179 814	25 060
Total	211 512	68 049	279236	31 977	266 121	62 302	288 271	67 214	356 903	82 949

Source: compiled by authors according to National Bank of the Republic of Kazakhstan, <http://www.nationalbank.kz>.

Table 3 presents a qualitative analysis of insurance sector in the Republic of Kazakhstan such as main figures of insurance sector of GDP billion tenge is made up to 239088,2 billion.

Table 3. The role of insurance sector in the Republic of Kazakhstan

Period	GDP, billion tenge	Insurance Premiums Ratio to GDP in %	Property Assets Ratio to GDP in %	Assets Ratio to GDP in %	Insurance Premiums Ratio to caput in tenge
2012	19 303,6	0,73	1,08	1,78	8 645,3
2013	27 571,9	0,64	0,84	1,41	10 537,4
2014	31 442,72	0,67	0,76	1,41	12 517,9
2015	34 291	1,53	0,74	0,81	16 272
2016	38 624,4	1,59	0,74	0,69	15 296,8
2017	40 884,1	2,02	0,99	0,70	16 331,4
2018	46 971,2	1,82	0,85	0,76	20 103,6

Source: compiled by authors according to National Bank of the Republic of Kazakhstan, <http://www.nationalbank.kz>.

In general, growth ratios of insurance market outrun equal the performance of all the economy of Kazakhstan. Such a successful development of insurance market is due to increasing wage rates and level of insurance culture among the population and professional mid-career education of participants in the insurance market. Thus, the insurance market of Kazakhstan is at a formation stage by international standards. By experts marks, the developed insurance markets, ‘life insurance’ in particular outrun Kazakhstan not less than a hundred years (Ivanov, 2008).

Due to fast entry of the republic into the World Trade Organisation (WTO) there is a need of studying consequences of integration for the homegrown insurance market into the developed architecture of the World Trade Insurance. It will be a basis for forming mechanism of harmonized interests for participants among Kazakhstan and World Trade Insurance Services.

4. Data and methods

This research has been used data of all the presented insurance companies in the Republic of Kazakhstan for the last 6 years. Data of the companies have been taken from reports of National bank of the Republic of Kazakhstan and financial data reporting of the companies itself placed in depositary of financial data reporting. The financial data reporting more than 30 companies from 2012 for 2018 only 224 observations have been analysed. Data for the insurance market services have been taken from reports on the current position of National Bank of the Republic of Kazakhstan.

For the analysis of company profitability panel data analysis approach for assessment of the factors influencing on it have been used. Taken data for research are longitudinal data, so there are multiple observations for the same insurance company, also there is a time dimension and the phenomenon is observed at different points in time. Thus, data have two dimensions as company and time. Not all observations are independent from each other. In such cases it is practically to use panel data method. Mertens et al. (2017) as an example of successful using of this method is a research impact to firm investment and development for profitability (Mertens et al. 2017.). Model of panel data with the fixed effects, model of panel data with random effects have been used, then Hausman Test for choosing the most effective model has been carried out.

Assessment was made by using a package of Gretl econometric program. This software product is specialized means for the econometric analysis and modeling. Thus, nowadays it is one of the most modern means for carrying out of this sort researches differing in usability and efficiency. As it extends gratuitously it makes this software package attractive (Gusev, 2015).

This research was guided by work of Sharif et. al (2012), Akotey et al (2013) and Sumaira and Amjad (2013). The research has been devoted to identification of communications between work of insurance companies and their separate figures. Two studies has been performed on the basis of Pakistan insurance companies (Sharif et. al, 2012 and Sumaira and Amjad, 2013), one is on the basis of the Republic of Ghana (Akotey et al, 2013).

The concept of profitability can be understood widely, as McClenahan (1999) wrote profitability like beauty, in the eye of the beholder. Different stakeholders prefer different indicators. But for this research there is a need to choose one basic indicator that would most fully represent profit on the invested funds. In production companies, the indicator return on assets is often the most revealing and generalizing. Some researchers use it to analyze the profitability of insurance companies (Pervan, 2013).

Features of the insurance company are in the structure of its assets and obligations. Therefore, the indicator for insurance companies should show how much profit the insurance company could be generate from received insurance premiums. The Net Investment Income Ratio (Nissim, 2010) is indicator that particularly well suited for this purpose, so it reflects profitability of the insurance companies.

Financial data reporting of the companies and their dynamics, size and age have been chosen as independent variables. The first financial indicator was leverage. Leverage can be calculated as the ratio of debts to equity, as well as the ratio of debts to assets. Often researchers believe that leverage negatively affects profitability, that the more liabilities a company has, the less its profitability (Asimakopoulos, Samitas, and Papadogonas, 2009). However, Barua et.al (2018) in his study on insurance companies of emerging economies discovered that leverage impact is not clear in short term period, whereas in long term perspective its impact really was negative. Also were taken such financial indicator as current liquidity ratio. And based on the data from financial reports were calculated grow opportunities and earnings volatility following Sharif et. al (2012), Akotey et al, (2013) and Sumaira and Amjad (2013).

5. Results

By presented panel data in the Table 4 it has been decided to form the regression model reflecting dependence of Profitability on the corresponding factors. The ordinary least squares and the generalized method of the least squares respectively have estimated parameters of panel data models with the fixed effects and panel data models with random effects.

The mix of explanatory variables on the basis of accounting control data are the following variables.

Table 4. Variables

Variable	Definition
Profitability	Ratio of net return before taxation to net premium
Leverage	Ratio of value of liabilities to the sum of insurance companies assets
Grow Opportunities	Ratio of sale uplift to the sum of insurance companies assets
Size	Base Premium Logarithm for insurance companies
Liquidity	Sum Assets Ratio to short-term liabilities
Age	Insurance Company Age is a shortfall of canvass and company forming year
Earning Volatitiy	It is profitability differential before taxation of previous year and year of observation divided into previous year i.e increment of growth is made

Source: compiled by authors

Researches include itself descriptive statistics, Pearson's correlation and results of panel models. The number of observation in panel data is 224 observations. 32 observations of insurance companies of the Republic of Kazakhstan from 2012 to 2018 are used in the Descriptive statistics (Table 5). Average value of the dependent variable is Profitability 0,3399. Standard deviation is 0,9863. The least value of profitability for organization is (-1,664), and the largest value of profitability for organization is 11,97.

Table 5. Descriptive statistics

Variable	Observation	Average	S.D.	Min	Max
Profitability	224	0,3399	0,9863	-1,664	11,97
Leverage	224	0,5000	0,2223	0,000	0,9381
Grow	224	0,6276	0,3968	0,000	2,073
Size	224	14,96	2,536	0,000	17,71
Liquidity	224	550,9	3501	-4985,0	43491
Age	224	12,08	6,551	0,000	25,00
Earning	224	0,1331	12,66	-127,5	82,51

Source: compiled and calculated by authors

Table 6. Complete Correlation Matrix

Correlation differentials, observation 1:1 - 32:7

5% criticality (double-sided) = 0,1311 for n = 224

Leverage	Grow	Size	Liquidity	Age	Earning	
1,0000	0,4200	0,5186	-0,0203	-0,1304	0,0537	Leverage
	1,0000	0,3740	-0,0352	-0,0381	-0,0401	Grow
		1,0000	0,0468	0,3668	0,0116	Size
			1,0000	0,0632	-0,0020	Liquidity
				1,0000	0,0625	Age
					1,0000	Earning

Source: compiled and calculated by authors

Table 6 depicts Pearson Index Correlation Matrix. Before starting model of panel data, it is necessary to check correlation between independent variables for the purpose of confirmation that there is no multicollinearity. As it

is seen from Table 6, there is no multicollinearity that confirms its result so as correlation is not up to 0.6 cut-off point.

Results of model of the fixed effects are given in Table 7. Considering values of parameters of model for this selection, it is possible to note importance of the Profitability variable from the Size variables which is the size of firm and has positive communication 0,0567399 and Age which is an age of firm and has positive communication 0,0401280, and other indexes have values close to 0 and have no significant effect on the resulting sign. An R-square in limits = 0,414391 between 0,043476. $F(37, 186) = 2,31378$ r-value 0,000314921.

Table 7. Fixed effects (Dependent variable: Profitability)

Variables	Differential	St. error	t-statistics	P-significance
Const	-0,391882	0,717947	-0,5458	0,5858
Leverage	-0,741087	0,690195	-1,074	0,2843
Grow	-0,349491	0,259838	-1,345	0,1803
Size	0,0567399	0,0614137	0,9239	0,3567
Liquidity	-2,11610	1,74643	-1,212	0,2272
Age	0,0401280	0,0296764	1,352	0,1780
Earning	-0,00242347	0,00520985	-0,4652	0,6424

Average dependent variables 0,339886	Statistics deviation of dependent variables 0,986306
Sum of overall surplus squares 127,0387	Statistics model error 0,826440
LSDV R-squared 0,414391	In term of R-square 0,043476
LSDV F(37, 186) 3,557252	P-significance (F) 6,39e-09
Likelihood Logogriph -254,3209	Akaike criterion 584,6419
Schwartz Criterion 714,2844	Hannah- Quinn criterion 636,9719
Rho parameter -0,233621	Durbin-Watson statistic 2,317286

Source: compiled and calculated by authors

Joint test on named regressors -

Test statistics: $F(6, 186) = 1,40901$

p-significance = $P(F(6, 186) > 1,40901) = 0,213178$

Test for constant differences in groups -

Main hypothesis: groups have cumulative constants

Test statistics: $F(31, 186) = 2,31378$

p-significance = $P(F(31, 186) > 2,31378) = 0,000314921$

Essential parameters at significance value are designated (10% ***), (5% **), (1% *) in assessment of models. Labeling by asterisks facilitates fast estimation of the importance of parameters in the considered models. The result is considered statistically reliable (significant) if p-level doesn't exceed 0,05. Results of random effects model are given in table-8. The Leverage variables, size and grow are only significant at the level of 10%. Liquidity, age and earning aren't essential, all of them exert impact on the size of profitability. R-square in limits = 0,188563 between 0,166127.

Table 8. Random effects (Dependent variable: Profitability)

Variables	Differential	St.error	Z	P-significance
Const	-0,447132	0,418575	-1,068	0,2854
Leverage	-1,22818	0,404352	-3,037	0,0024 ***
Grow	-0,649100	0,188441	-3,445	0,0006 ***
Size	0,114502	0,0375616	3,048	0,0023 ***
Liquidity	2,25073	1,68978	0,1332	0,8940
Age	0,00781502	0,0127391	0,6135	0,5396
Earning	-0,00142384	0,00469645	-0,3032	0,7618

Average dependent variables	0,339886	Statistics deviation of dependent variables	0,986306
Sum of overall surplus squares	176,0286	Statistics model error	0,900662
R-square	0,188563	R-square corrected	0,166127
F(6,217)	8,404491	P-significance (F)	3,32e-08
Likelihood Logogriph	-290,8503	Akaike criterion	595,7005
Schwartz Criterion	619,5821	Hannah- Quinn criterion	605,3403
Rho parameter	0,127664	Durbin- Watson statistic	1,654883

Source: compiled and calculated by authors

Between group variance = 0,0670349

Within variance = 0,683004

theta, used for quasi-demeaning (demeaning) = 0,230093

corr (y,yhat)^2 = 0,186078

Joint test on named regressors -

Asymptotic test statistics: Chi-square (6) = 34,3525

p-significance = 5,75101e-006

Breusch-Pagan Test-

Main hypothesis: Special variance for error observing =0

Asymptotic test statistics: Chi-square (1) = 10,1633

p-significance= 0,00143261

Hausman Test -

Main hypothesis: OLSM is justifiable

Asymptotic test statistics: Chi-square (6) = 21,1331

p-significance = 0,00173628

It is very difficult for above described model to choose what model approaches. Hausman's test will be started to cope with this problem for solving suitable model from two possible options. In addition, the model with random effects was statistically significant. See Table 8, Table 9, Table 10 and Table 11.

Table 9. Hausman Test

Variables	Fixed	Random	Differential
Leverage	-0,741087	-1,22818	-0,4871
Grow	-0,349491	-0,649100	-0,2996
Size	0,0567399	0,114502	0,0578
Liquidity	2,11610	2,25073	0,1346
Age	0,0401280	0,00781502	-0,0323
Earning	-0,00242347	-0,00142384	0,0010

Diagnostics: using n = 32 cross-sectional units

Source: compiled and calculated by authors

Table 10. Fixed effects estimator allows for differing intercepts by cross-sectional unit

Variables	Index	St.error	t-statistics	P-significance
const	-0,391882	0,717947	-0,5458	0,5858
Leverage	-0,741087	0,690195	-1,074	0,2843
Grow	-0,349491	0,259838	-1,345	0,1803
Size	0,0567399	0,0614137	0,9239	0,3567
Liquidity	-2,11610e-05	1,74643e-05	-1,212	0,2272
Age	0,0401280	0,0296764	1,352	0,1780
Earning	-0,00242347	0,00520985	-0,4652	0,6424

Source: compiled and calculated by authors

Residual variance: $127,039 / (224 - 38) = 0,683004$

Cumulative significance for differential in average groups

$F(31, 186) = 2,31378$ p-significance 0,000314921

(Low p-significances indicate to a weak main hypothesis of adequacy the integrated panel data model preferring to model with the fixed effects.)

Variance estimators:

between = 0,0670349

within = 0,683004

theta used for quasi-demeaning = 0,230093

Table 11. Random effects estimator allows for a unit-specific component to the error term

Variables	Index	St. error	t-statistics	P-significance
Const	-0,447132	0,418575	-1,068	0,2866
Leverage	-1,22818	0,404352	-3,037	0,0027 ***
Grow	-0,649100	0,188441	-3,445	0,0007 ***
Size	0,114502	0,0375616	3,048	0,0026 ***
Liquidity	2,25073e-06	1,68978e-05	0,1332	0,8942
Age	0,00781502	0,0127391	0,6135	0,5402
Earning	-0,00142384	0,00469645	-0,3032	0,7620

Source: compiled and calculated by authors

Breusch-Pagan test statistic:

$LM = 10,1633$ with p-value = $\text{prob}(\text{chi-square}(1) > 10,1633) = 0,00143261$

(Low p-significances indicate to a weak main hypothesis of adequacy the integrated panel data model preferring to model with random effects.)

Hausman test statistic:

$H = 21,1331$ with $p\text{-value} = \text{prob}(\text{chi-square}(6) > 21,1331) = 0,00173628$

(Low p -significances indicate to a weak main hypothesis of adequacy the integrated panel data model preferring to model with the fixed effects.)

Conclusions

As a result of empirical testing the hypothesis for positive communication for level of a financial leverage, the size of firm and a hypothesis for inverse relation for profitability, a possibility for growth of the fixed production assets and the equipment, not debt tax board with profitability level are confirmed. It is found out that the greatest impact on profitability of insurance company is exerted by financial leverage. The received results for communications of the size of firm, possibilities for growth of the fixed production assets and the equipment correspond to provisions for the compromise theory. While the results for renability and financial leverage correspond to the theory of order the debt to assets figure shows as far as the company can fulfill its current obligations. Respectively the adequacy of reflection for obligations in financial data reporting influences on assessment of profitability for insurance company by external users. As how correctly estimated depends company's look itself for financial data reporting users, and consequently what decisions will be made by investors, creditors and other stakeholders.

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Alina KULUSTAYEVA is PhD Student in Accounting and Auditing of Narxoz University, Almaty, Kazakhstan. Research interests: finance, insurance, insurance companies, economy.

ORCID ID: orcid.org/0000-0002-2686-6617

Aigul JONDELBAYEVA is Candidate of Economic Sciences, PhD of Narxoz University, Almaty, Kazakhstan. Research interests: finance, insurance, insurance companies, economy.

ORCID ID: orcid.org/0000-0001-8308-4470

Azhar NURMAGAMBE TOVA is Candidate of Economic Sciences, PhD of Al-Farabi Kazakh National University, Almaty, Kazakhstan. Research interests: finance, insurance, insurance companies, economy, entrepreneurship, innovation.
ORCID ID: orcid.org/0000-0001-9142-4420

Aliya DOSSAYEVA is Candidate of Economic Sciences of Turan University, Almaty, Kazakhstan. Research interests: finance, insurance, insurance companies, economy, entrepreneurship, innovation.
ORCID ID: orcid.org/0000-0003-4340-9538

Aliya BIKTEUBAYEVA is Candidate of Economic Sciences of Turan University, Almaty, Kazakhstan. Research interests: finance, insurance, insurance companies, economy, entrepreneurship, innovation.
ORCID ID: orcid.org/0000-0003-3991-0688

Register for an ORCID ID:

<https://orcid.org/register>

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OPTIMIZATION AND MANAGEMENT OF THE LECTURE TRAINING STRATEGY FOR STUDENTS

Elvira Ruzieva¹, Aliya Nurgaliyeva², Botagoz Duisenbayeva³, Dina Kulumbetova⁴, Mira Zhabbarkhanova⁵

^{1,2,5} Narxoz University, Zhandosov st. 55, Almaty, Kazakhstan

^{3,4} Kazakh-Russian International University, Aiteke bi street 52, Aktobe, Kazakhstan

E-mails: ¹ earuzieva@mail.ru; ² aliya_mn@mail.ru; ³ duisenbayeva_b@mail.ru; ⁴ dina_424@mail.ru; ⁵ mira.saparali@mail.ru

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Abstract. Changing the needs of students in the consumption of information requires teachers to constantly search for new teaching methods, which, in turn, indicates the construction of their own learning strategy and its optimization. In this article, the authors present their own experience in developing a lecture learning strategy built on their own experience. Personal experience of teaching led to the emergence of the hypothesis that a change in the type of information provided (for example, from presentation to video, then to discussion, etc.) and the frequency of repetitions of important aspects of the topic can improve the learning. To test this hypothesis, the article attempted to use econometric modeling methods that made it possible to optimize the learning strategy taking into account the indicated factors.

Keywords: learning strategy; information assimilation factor; quality of learning; information perception

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JEL Classifications: I22, I25.

1. Introduction

With the increasing volatility of the market, and, consequently, the needs of employers, the issue of maximizing the assimilation of the information provided at classes in universities is becoming more and more relevant. The age of information technology, on the one hand, significantly expands the possibilities of students, and, on the other hand, significantly distracts from the "useful" information. This situation significantly changes the way students perceive information. If earlier learners could draw knowledge mainly through reading (visually), then today's sources are so multifaceted and diverse that information can be perceived through reading, watching videos, listening to audio literature and much more. Under these conditions, it is much more difficult for

university teachers to determine the most optimal way to provide information in order to ensure maximum material digestibility. This task can be described as determining the optimal student learning strategy.

2. Literature review

An analysis of the scientific literature regarding the human's ability to perceive information shows that a variety and a constant focus on the attention of listeners are necessary for the best mastering of the material.

Studies of the biological and psychological aspects of human information perception occupy a rather long epoch of time. In particular, Albert Mehrabian in his publication "Non-Verbal Communication", published in 1972, outlined his "simple linear model": "General feeling = 7% verbal feeling + 38% auditory feeling + 55% feeling of mimicry" (Mehrabian and Ferris, 1967). In other words, the student absorbs 7% of verbal material, 38% of the material heard, and 55% of the material transmitted verbally.

Psychologist Jerome Bruner from New York University showed in his research that people only remember 10% of what they hear and 20% of what they read, but about 80% of what they see and do (Samreen and Malik 2012). Anna Karpf refutes the percentage perception of information, referring to the views of some scientists. She writes "according to the philosopher Karl Popper, judgment is unscientific if it is observable or experienced. Imagine that I ask someone how to get to the bus stop for bus number 24 at nine in the morning. If I only paid 7% attention to the verbal content of their answer, we could easily wander in search of a bus at nine in the evening. It is completely absurd to suppose that words play such an insignificant role in human conversation, and a person so important: it clearly depends on who speaks with whom, when, where and why" (Karpf, 2014).

One way or another, one can say that a person can perceive information visually, verbally, and mimically. Much depends on the development of a certain memory in a person, all individually. Such an approach to the problem of mastering information forces teachers to apply various learning technologies in order to adapt them for different categories of students.

At the same time, a professor at Ohio State University, Edgar Dale, conducted a study according to which he taught the same educational material, but in various ways, he discovered and analyzed the ability to reproduce the material studied. The results of the study were published in the "Dale's cone of experience" in the form of the Dale pyramid (Figure 1).

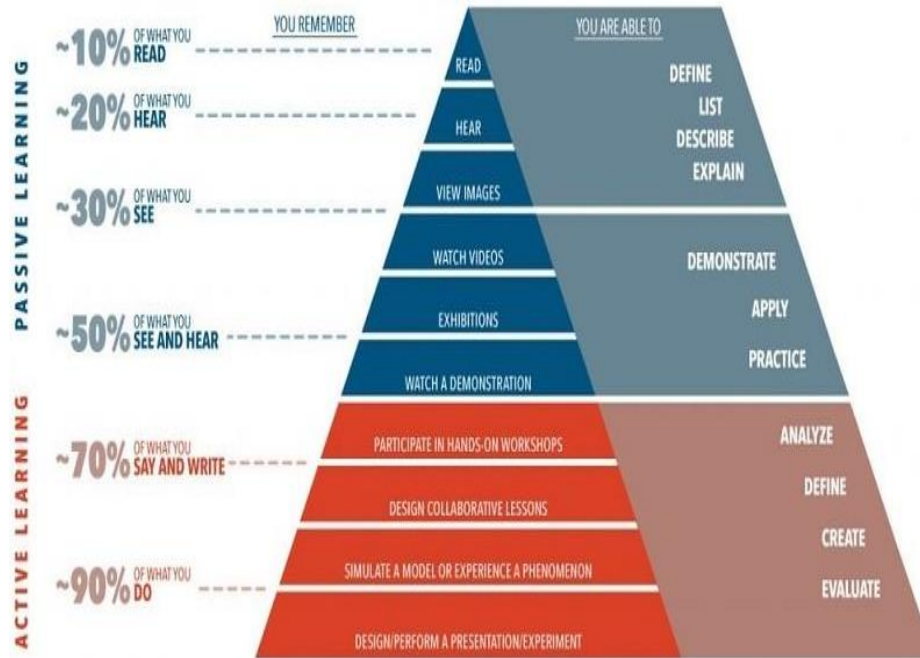


Figure 1. Dale's Pyramid

Source: compiled by authors

From Figure 1 it can be seen that, according to Edgar Dale, for the most part a person is able to perceive information from what he has seen or written by himself. It should be noted that many studies confirm this fact. This pyramid makes it possible to understand that modern learning should be multi-format, that is, a student should read, see, hear and write for better learning.

Fishbein and Eisen's Theory of Reasonable Action Theory (1975) determined that human behavior is determined by his perception of the environment (Fishbein and Ajzen 1975). O'Malley and McCrow in their work noted that the efficiency of perception of educational technologies depends on the level of perception of these teaching methods, characteristics and initial knowledge of students (that is, the level of knowledge of prerequisite disciplines) (O'Malley and McCraw 2017).

Understanding the need to improve the assimilation of information led to the emergence of various strategies and techniques aimed at the study of this direction. In particular, Khalid Sabie Khamees proposed a strategy for learning English and tested it on 66 undergraduate students. The study was aimed at studying the utility of memorization as a strategy for learning English. The results showed that students used the memorization strategy mainly to enhance their vocabulary, definitions, and literary texts. Students noted that this strategy allowed them to improve their achievements in the field of learning English. It was found that understanding should take precedence over memorization. The study led to the conclusion that memorization is a low-level cognitive strategy that can be used among other high-level cognitive strategies in the process of learning English (Khamees 2016).

It is of interest to research that modern students perceive information better through familiar and understandable ways: blogs, videos, etc. In particular, Andrew K. Lui, Yannie H.Y and Sandy C. LI conducted a study on the use of compulsory blogging in the process of studying the discipline and came to the conclusion that students who

kept a blog for a year significantly surpassed those who did not (Lui and Yannie, Sandy 2017). Despite the comment by Williams and Jacobs that it was a mistake to force students to participate in a blog for evaluations (Williams and Jacobs 2016), since this reduces the quality of education, the study showed that while students are blogging, there is a possibility that their perception of information may change in accordance with the developed tasks according to the course being studied and that the obligatory use of blogs in the course is beneficial. By applying various teaching methods, teachers are aware that many students do not enjoy all the benefits of learning available to them (Wozniak and Silveira 2017; Girdzijauskaitė et al., 2019). There is a different perception of educational technologies not only because of the natural changes in education, but also because the information is perceived by students in different ways, based on their individual physiological features. The results of the study by Brian Detlora, Lorne Booker, Alexander Serenko and Heidi Julien showed that passive teaching methods are not an effective learning style that promotes positive psychological, behavioral results. While it is active learning methods that produce more positive effects (Detlora, Booker and Serenko 2017).

Pushkareva, T.P. conducted a study on improving the perception of educational material in mathematics. The results of the experiment showed that in order to increase the level of understanding of mathematical material, it is necessary to ensure the systematic use in the educational process of visual models of one particular type or their combinations and dynamic images of mathematical objects; development of methodological techniques for the inclusion in the educational process of visual models and dynamic images of mathematical objects; presence of sensory accompaniment in space and in time, i.e. dynamic visualization of information and knowledge (Pushkareva 2016). The scientific literature contains research on the stages of perception of information. In particular, according to Z.A. Kulikova, S.N. Lashchenova and others, the process of knowledge formation includes the following steps: perception of an object (identifying an object and determining its essential properties); understanding (identification of significant relationships and relationships); memorization of selected properties and relationships; active reproduction by the subject of these properties and relations. The final stage of the process of learning is their transformation - the inclusion of new knowledge in the structure of past experience and use as a means of building another new knowledge (Nurminsky and Gladysheva 2018). V.P. Bespalko suggests the following stages: understanding, recognition, reproduction, application, creativity (Bespalko 2017). S.L. Rubinshtein notes the importance of mastering the knowledge of such cognitive operations as comparison, analysis, synthesis, abstraction, generalization of conclusions by induction and deduction, etc. (Rubinstein 2015). In each case, the authors point out a creative approach to learning, as well as the advantage of understanding over simple memorization. At the same time, it is necessary to take into account the fact that, as studies show, a person forgets most of the information received. In particular, Herman Ebbinghaus noted that 90% of what children learn in a classroom, they forget for 30 days, and most of them in the first hours after receiving information (Karpenko and Yaroshevskiy 2016). This fact confirms John Medina in his book "Brain Rules" (Brain Rules), noting also that knowledge is recorded not at the time of training, but as a result of repetitions after certain periods of time (Medina 2017). The brain has the ability to "relax" from receiving information "every 5–10 seconds for a fraction of a second, which is why repetition of the same information is required in various ways and lexical means" (Tovazhnyanskiy, Romanovs'kiy and Bondarenko 2016). In order to improve the degree of assimilation of information, many scientists have proposed various approaches. In particular, Dick Schmidt and Bob Björk considered the so-called "block practice", which implies the study of the same material in blocks, by repeating the information many times over a long time (Bjork 2018). In this direction, many studies were also conducted, the results of which took place in various techniques of memorizing information. For example, B. Sullivan and H. Thompson suggest using the following recipe of repetition: the first memorization is done after 5 seconds, then after 25 seconds, after 2 minutes, after 10 minutes, after 1 hour, after 5 hours, 1 day, 5 days, 25 days, 4 months, 2 years, etc. (Sullivan and Thompson 2014)

3. Data and methods

Studies of various authors regarding the degree of memorization and assimilation of information lead to the conclusion that people memorize it in various ways, each in its own way. Someone has more developed visual memory, someone has auditory. However, the fact that a person loses some of the information received (forgets) leads to an awareness of the need to enhance the digestibility of the material. In other words, research confirms that to increase the amount of memorized information requires repetition of the material under study. These facts suggested that the strategy of learning (teaching) should include, first, various forms of providing information (video lectures, presentations, story, group assignments, discussions, writing, etc.), and second, important information must be repeated at regular intervals.

If we approach the solution of the problem from a mathematical point of view, we can formulate the task of optimizing the learning strategy and form a model. At the same time, the task is to determine on the basis of its own research the information assimilation coefficient, the dependence of this coefficient on the form of information presentation, the form of training (full-time, evening), as well as to identify the most effective time for changing the type of information presentation to enhance the attention of students. In order to obtain data for the formation of a learning strategy optimization model, we conducted our own research in teaching the disciplines "Securities Market" and "Bank Accounting" in the full-time and evening training formats for two years. In total, 271 full-time students and 82 evening classes were covered. Classes were held in the format of "blending learning" and used video clips, presentations, lectures, discussions, group tasks. In order to consolidate important aspects of the topic, it was necessary to repeat these points. Naturally, at each lesson all the presented teaching methods were not applied at once, however, they alternated after a certain period of time. This alternation was arbitrary, but allowed us to estimate the coefficient of mastering the material, as well as to obtain data for assessing the dependence of the coefficient on the change in the type of presentation of information and the number of repetitions of important aspects of the topic.

To build a general strategy optimization model, a dynamic programming method was used, based on the R. Bellman's optimality principle, according to which the optimization problem will be reformulated in recursive form. The methodology of dynamic programming requires the creation of a special case of a functional equation of dynamic programming for each specific optimization problem that needs to be solved (Kormen and Leyzerson, Rivest, Shtayn 2017). For an optimization problem of the form $\text{opt}_{d \in \Delta} \{O(d)\}$ d is called a solution, which is selected from the set of acceptable solutions Δ . The optimum H is called the objective function, and $O^* = O(d^*)$ is called the optimum, where d^* - is the value of $d \in \Delta$, for which $O(d)$ has an optimal (minimal or maximal) value. It also assumes that d^* optimizes O , therefore $d^* = \arg \text{opt}_d \{O(d)\}$. In dynamic programming, optimization problems consist in finding a set of solutions $\{d_1, d_2, \dots, d_n\}$, which, taken together, give the optimal value O^* of the objective function $h(d_1, d_2, \dots, d_n)$. Solving such problems by enumeration, that is, by simultaneously evaluating $h(d_1, d_2, \dots, d_n)$ for all possible combinations of the values of the arguments of the solution, is called the "brute force" approach, that is, this approach is clearly ineffective. Therefore, instead of making decisions at the same time, dynamic programming assumes that decisions can be made in a certain sequence (d_1, d_2, \dots, d_n) , that is, such as:

$$O^* = \text{opt}_{(d_1, d_2, \dots, d_n) \in \Delta} \{h(d_1, d_2, \dots, d_n)\} = \text{opt}_{d_1 \in D_1} \{ \text{opt}_{d_2 \in D_2} \{ \dots \{ \text{opt}_{d_n \in D_n} \{h(d_1, d_2, \dots, d_n)\} \} \dots \} \} \quad (1)$$

These are the so-called sequential decision-making processes, where the ordered set (d_1, d_2, \dots, d_n) belongs to a certain decision-making space $\Delta = D_1 \times D_2 \times \dots \times D_n$ for $d_i \in D_i$. Examples of decision areas: $\Delta = B^n$, a special case of Boolean solutions, where each set of solutions D_i equals $B = \{0, 1\}$; and $\Delta = \Pi(D)$ - is the permutation of the set of acceptable solutions D (Mauch 2017).

The coefficient of learning was calculated as the ratio of the correct answers on the test questions for each lesson to the total number of questions in the test. For each lesson, the weighted average value of the learning coefficient was determined, where the number of students with a certain coefficient value was the weight. At the same time, the weighted average values of the learning coefficients for the convenience of calculations were grouped in accordance with the result of reductions to the hundredth. For example, if a value of 0.973 was obtained, then it was assigned to the group 0.97, the value 0.942 to the group 0.94, and so on.

For each lesson, students were asked test questions of the previous lesson to determine the level of mastering the topic. Each test consisted of 5 questions with five possible answers. There were 7 days between classes, that is, this is the period between taking the information and checking for its mastering. Each topic was divided into 4 main questions. In turn, the dependence of the assimilation coefficient on the change of the type of training, as well as the number of repetitions of the main aspects of the topic were estimated using the multiple regression equation. At the same time, the number of types of information provided was changed.

Calculations were carried out in Excel.

The results of the study. To obtain the regression equation, we define for the beginning the vector of the regression coefficients. According to the method of least squares, the vector is obtained from the multiplication of matrices in the expression: $S = (x^T x)^{-1} x^T y$.

The $x^T x$ matrix is as follows:

$$x^T x =$$

92	215,74	196,79
215,74	639,594	521,492
196,79	521,492	451,117

In the matrix $x^T x$, for example, the number 215,74, lying at the intersection of the 1st row and the 2nd column, is obtained as the sum of the products of the elements of the 1st row of the matrix x^T and the 2nd column of the matrix x .

The matrix $x^T y$ has the following form:

$$x^T y =$$

50,05
146,078
120,577

Find the inverse matrix $(x^T x)^{-1}$, which will have the following form:

$$(x^T x)^{-1} = \begin{bmatrix} 0,417 & 0,133 & -0,336 \\ 0,133 & 0,0698 & -0,139 \\ -0,336 & -0,139 & 0,309 \end{bmatrix}$$

As a result of matrix multiplication, the vector of regression coefficient estimates will be equal to:

$$y(x) = \begin{bmatrix} 0,417 & 0,133 & -0,336 \\ 0,133 & 0,0698 & -0,139 \\ -0,336 & -0,139 & 0,309 \end{bmatrix} * \begin{bmatrix} 50,05 \\ 146,078 \\ 120,577 \end{bmatrix} = \begin{bmatrix} -0,171 \\ 0,127 \\ 0,194 \end{bmatrix}$$

So, the regression equation describing the dependence of the number of repetitions during one occupation of important aspects and the number of changes in the type of presentation of the material has the following form:

$$y = -0,1708 + 0,1275x_1 + 0,1945x_2 \quad (2)$$

where

y – learning rate;

x_1 – number of repetitions of important aspects of a topic;

x_2 – the number of changes in the type of presentation material.

Correlation coefficients and indicators of variances are presented in table 1.

Table 1. Indicators of correlations and dispersions

Signs of x и y	$\sum x_i$	$\bar{x} = \frac{\sum x_i}{n}$	$\sum y_i$	$\bar{y} = \frac{\sum y_i}{n}$	$\sum x_i y_i$	$\overline{xy} = \frac{\sum x_i y_i}{n}$	$D(x)$	$D(y)$
for y и x_1	215,74	2,345	50,05	0,544	146,078	1,588	1,453	0,0715
for y и x_2	196,79	2,139	50,05	0,544	120,577	1,311	0,328	0,0715
for x_1 и x_2	196,79	2,139	215,74	2,345	521,492	5,668	0,328	1,453

Source: compiled and calculated by authors

In this case, the paired correlation coefficients have the following values:

$$r_{x_1y} = \frac{1,59 - 2,35 * 0,54}{1,21 * 0,27} = 0,968$$

$$r_{x_2y} = \frac{1,31 - 2,14 * 0,54}{0,57 * 0,27} = 0,959$$

$$r_{x_1x_2} = \frac{5,67 - 2,14 * 2,35}{0,57 * 1,21} = 0,945$$

Assess the β -coefficients:

$$\beta_1 = \frac{0,968 - 0,959 * 0,945}{1 - 0,945^2} = 0,575$$

$$\beta_2 = \frac{0,959 - 0,968 * 0,945}{1 - 0,945^2} = 0,416$$

The multiple correlation index is:

$$R = \sqrt{1 - \frac{0,29}{6,58}} = 0,9777$$

Since R is close to 1, the connection between the resulting indicator y and the factors x_1 is quite strong.

The coefficient of determination is $R^2 = 0,9559$. Since R^2 is close to 1, the resulting regression equation almost completely explains the behavior of the indicator y.

The results of dynamic programming allowed us to obtain the following distribution of resources x_1 and x_2 (table 2).

Table 2. Distribution of the number of repetitions and change the type of presentation of the material (optimal values)

Learning rate	The number of repetitions of important aspects of a topic	The frequency of changing the type of training
1	3,98	2,66
0,99	3,98	2,64
0,98	3,98	2,77
0,97	3,94	2,76

0,96	3,97	2,78
0,95	3,98	2,89
0,94	3,97	2,67
0,93	3,95	2,79
0,92	3,77	2,81
0,91	3,87	2,56
0,9	3,56	2,78
0,89	3,67	2,77
0,88	3,55	3
0,87	3,54	2,57
0,86	3,28	2,56
0,85	3,65	2,55
0,84	3,89	2,58
0,83	3,77	2,57
0,82	3,9	2,59
0,81	3,82	2,67
0,8	3,45	2,66

Source: compiled and calculated by authors

4. Results

The results of the study of the influence of the number of repetitions of important aspects of the topic and the number of changes in the presentation of information for students on the coefficient of mastering the material suggest that an increase in x_1 by 1 unit of measurement leads to an increase in the coefficient of mastering by an average of 0,127. At the same time, an increase of x_2 by 1 unit of measurement leads to an increase in the absorption coefficient by an average of 0,194.

These data show that the effect of changing the type of presentation of the material is higher than the number of simple repetitions, although it is also impossible to exaggerate the importance of the latter. At the same time, when comparing the coefficients β_1 and β_2 , it is noticeable that $\beta_1 = 0,575$ is higher. This indicates that factor has a strong influence on the result of assimilation. It was established that in the situation under study, 95,59% of the total variability of the assimilation coefficient is explained by the change in the indicated factors. At the same time, the parameters of the model are statistically significant. Indeed, as practice has shown, when changing the type of presentation of the material, for example, from presentation to video, to group work, to discussion, etc., there was some revival of the audience, attraction and increased concentration, which apparently made it possible to better understand the issue under consideration. At the same time, the presence of repetitions of important aspects of the topic increases the coefficient of learning by another 0,127.

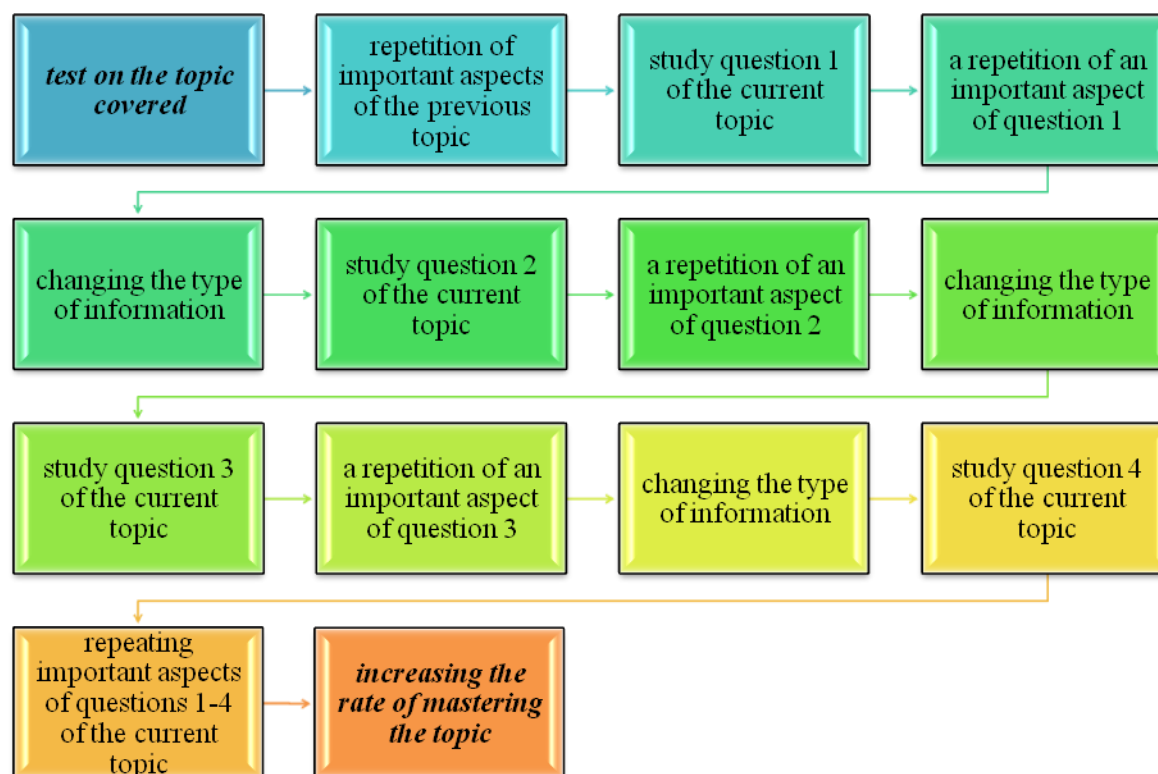


Figure 2. The optimal learning strategy, according to the authors

Source: compiled by authors

The results of table 2 clearly show that a higher rate of assimilation of information is provided with an appropriate number of repetitions and a change in the type of presentation of the material. Considering the fact that the teacher spends about 5-10 minutes out of 50 for various activities not related to the transfer of information (roll call of students, video connection, etc.), taking into account the fact that the classes were tested for 5 minutes to check the mastery of the material of the previous topic, the net learning time remains about 40 minutes. When calculating 4 iterations to study a topic, it turns out that after considering each question, it is necessary to repeat the main aspects of the topic and change the type of presentation of the material. As a result, the optimal learning strategy will be as follows.

As the results of testing in practice of this strategy have shown, such an approach significantly increases the degree of material assimilation, and regular repetitions with a change in the type of material presentation reinforce the quality of training.

Conclusions

However, for the effective implementation of this strategy requires the introduction of some effort and development from the teacher. In particular, before implementing this strategy, the following should be implemented:

1) Break the topic down into basic questions (it's not a trifle here, it's important that the questions cover the most significant aspects of the topic, the remaining points (less important) should flow from the basic questions;

- 2) To determine the types of information provision (video materials, interactive presentations, group classes, exercises, discussions, etc.);
- 3) At each lesson, it is necessary to develop a test on the previous topic (as the own practice of the authors showed, 5 questions are enough, but the most important ones);
- 4) Video material and other types of material presentation should cover only one question or, better, part of the question; this video should not be more than 2 minutes);
- 5) It is imperative to repeat important aspects of the questions, in this case, it is necessary to indicate them briefly and clearly;
- 6) Practical exercises should be structured in such a way that the students themselves either prescribe questions of the topic or discuss them or exercises.

The proposed training strategy was tested in practice when conducting the following disciplines: “Securities Market” and “Bank Accounting”. In the future, it is intended to conduct further research regarding the assessment of the quality of education, the definition of criteria for assessing assignments that most fully allow for objectively assessing the results of students' work, excluding plagiarism, cheating and “using” the knowledge of other students.

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Elvira RUZIEVA is Candidate of Economic Sciences, Associate professor of Narxoz University, Almaty, Kazakhstan. Research interests: finance, insurance, insurance companies, economy.

ORCID ID: orcid.org/0000-0001-9120-7776

Aliya NURGALIYEVA is Candidate of Economic Sciences, Associate professor of Narxoz University, Almaty, Kazakhstan. Research interests: finance, insurance, insurance companies, economy.

ORCID ID: orcid.org/0000-0001-6044-6926

Botagoz DUSENBAYEVA is Candidate of Economic Sciences, Associate professor of Kazakh-Russian International University, Aktobe, Kazakhstan. Research interests: finance, insurance, insurance companies, economy, entrepreneurship, innovation.

ORCID ID: orcid.org/0000-0001-5959-7946

Dina KULUMBETOVA is Candidate of Economic Sciences, Associate professor of Kazakh-Russian International University, Aktobe, Kazakhstan. Research interests: finance, insurance, insurance companies, economy, entrepreneurship, innovation.

ORCID ID: orcid.org/0000-0002-5566-7107

Mira ZHAPBARKHANOVA is Candidate of Economic Sciences, Associate professor of Narxoz University, Almaty, Kazakhstan. Research interests: finance, insurance, insurance companies, economy.

ORCID ID: orcid.org/0000-0001-5448-3827

Register for an ORCID ID:

<https://orcid.org/register>

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TAX REVENUES ESTIMATION AND FORECAST FOR STATE TAX AUDIT

Madina Serikova ¹, Lyazzat Sembiyeva ², Kuralay Balginova ³, Gulzhan Alina ⁴, Aliya Shakharova ⁵,
Anar Kurmanalina ⁶

^{1,2,5} L.N. Gumilyov Eurasian National University, Satpayev street 2, Astana, Kazakhstan

³ Baishev University, Broth. Zhubanova street 302a, Aktobe, Kazakhstan

⁴ Kazakh University of Economics, Finance and International Trade,
Zhubanova 7 Street, Astana, Kazakhstan

⁶ Karaganda Economic University of Kazpotreboysuz, Akademicheskaya 9 Street, Karaganda, Kazakhstan

E-mails: ¹ madina2281@mail.ru; ² sembiyeva@mail.ru; ³ sembiyeva@mail.ru; ⁴ guljanalina@rambler.ru; ⁵ shaharovaaliya@yandex.kz; ⁶ anar68@mail.ru

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Abstract. The forecast model analysis of dependence of tax revenues of the state budget on macroeconomic indicators is presented. For example, the hypothesis of the impact of total retail trade on domestic taxes on goods, works and services through correlation and regression analysis is studied. Moreover, the influence of nominal income per capita, the volume of industrial products (goods and services), and investments in fixed capital on income tax was assessed. In the course of the study, the indicator of crude oil and natural gas production was selected and its impact on tax revenues from international trade and foreign operations of the country was analyzed. Thus, the importance of methods of forecasting tax revenues in the context of state tax audit and budget planning is substantiated.

Keywords: tax; state budget; tax audit; tax revenues; income tax; modeling; planning; forecasting; macroeconomic indicators; scenario method.

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JEL Classifications: H25, H30, H32, O23

1. Introduction

In the context of the implementation of the state audit, special requirements are presented in order to improve the activities of the tax authorities, the introduction of priority standards for the provision of public services, as well as improving the accuracy of forecasting budget revenues through modern information technologies. One of the most important tasks of the state tax audit of the system of tax administration and tax system of the country as a whole are the efficiency and effectiveness of the tax authority activities on planning and forecasting as well as completeness and timeliness of tax revenues. The formation and transition to the market economy required the change in the tax system of emerging economies. Tax forecasting is one of the most difficult areas of reform. This

particular difficulty is due to the fact that the forecasting of tax revenues is directly related to the function of economic planning, the essence of which has been radically revised in recent years. In all spheres of social activity, planning "from the achieved" gradually give to strategic planning. Strategic planning fundamentally changes the nature of the tasks of each stage in the process of tax forecasting and assessment. Responsibility for the calculation of certain reporting indicators changes to the responsibility for the creation of an intermediate result for a common interdepartmental project designed to solve a specific management problem (for example, finding ways to cover the budget deficit, reducing the tax burden, etc.). Thus, modern tax forecasting and assessment are impossible without coordination of efforts between departments, including in such aspects as data exchange, harmonization of methodologies, General setting of tasks, as well as internal and external tax audit. The main general conclusion in the analysis of the experience of tax forecasting of countries with economies in transition can be considered as the extreme non-study of this topic and the extreme difficulties of such international analysis. This conclusion is supported by a special comparative study of income forecasting methods in lower-income countries of the International Monetary Fund. According to this report, there is a tendency to adjust formally obtained macroeconomic indicators in the direction of optimistic rather than conservative scenarios (which was also noted by the IMF "with surprise"). In most countries with economies in transition, tax forecasting is the responsibility of one body (usually the Ministry of Finance), but in fact it involves a large number of other institutions, with which coordination is often difficult. The International Monetary Fund study found that 85% of the lower incomes countries in their sample as forecasting methods used a combination of subjective estimates and methods of the simplest extrapolation of current values for future periods. Moreover, the official tax forecast is drawn up not earlier than three months before the corresponding budget period. Such a short period of time usually does not allow tax forecasts to play a significant role in the discussion of the budget. The International Monetary Fund explains this problem by the low technical formalization of forecasting procedures. The organization for economic cooperation and development recommends that countries with economies in transition adopt the forecast budget no later than 6-8 months before the start of the relevant budget period. Most organizations involved in fiscal forecasting in OECD countries use the so-called "bottom-up" approach in their models. This means that tax forecasting is carried out separately in the context of separate tax and non-tax sources.

The results of these specific projections are subsequently summarized for the analysis of aggregated financial indicators. This approach has many obvious advantages. This allows you to get a detailed forecast of the sources, as well as to analyze the contribution of various taxes in the structure of total revenues and budget deficits. In addition, government agencies usually apply the most detailed models, which contain forecasts not only for sources, but also for separate fund, levels of government and extra-budgetary funds. The only limitation to this approach is its high requirements for the availability of statistical data, as well as the technical difficulties of consistency providing between such complex models and macroeconomic and expenditure projections. For these reasons, many countries have started to use cause-and-effect forecasting techniques, in particular by combining regression and modelling techniques in tax analysis. Thus, on the basis of systematization and generalization of existing methods of forecasting in the course of the study, possible scenarios of tax revenues are proposed by constructing forecast models depending on macroeconomic indicators.

The objects of the study are tax revenues to the state budget and macroeconomic indicators of the Republic of Kazakhstan.

2. Methodology and/or theoretical framework

The main method of forecasting for the tax revenues dynamics model creation was paired by correlation-regression analysis, which consists of determining and describing the relationship between the observed and the explanatory variable.

At the first stage of the study, it is necessary to identify the tax revenues types that take the largest share in the structure of total tax revenues. At the next stage of the analysis, for each studied type of tax, we determine the presumptive factor that has the greatest impact on the resultant variable. Then we create a correlation chart of the dependence between indicators, where the factor indicator is located on the abscissus axis, and the influencing indicator is on the ordinate axis.

In order to explain the relationship tightness we model a correlation matrix of the relationship between the indicators. Next, there is defined the main characteristics of the identified relationship between the dependent variable and the explanatory variable quality. In case of a sufficient level of interrelation closeness detection, there is taken the obtained equation of the pair linear regression.

At the final stage, based on the scenario analysis, there is predicted the dynamics of the each type of tax revenues.

In the study the following methods were used:

- analysis of Kazakhstani tax revenue quarterly statistical data by the period of 2007–2017,
- synthesis,
- modeling based on a correlation-regression analysis between tax revenues and total retail trade, average monetary income per capita, the volume oil and natural gas production,
- forecasting tools (the scenario method).

3. Literature review

Research in the field of planning and forecasting tax revenues, carried out by modern authors, most often refers to the consideration of intergovernmental fiscal relations problems and regional tax revenues, as well as the opportunities for growth of these revenues through the largest taxpayers effective work. Meanwhile, the existing system of tax administration does not fully implement its inherent functions of eliminating tax asymmetry and improving the effectiveness of tax policy. It does not stimulate business performance, especially in the context of its consolidation. The analysis and evaluation methods underestimation narrows the boundaries of obtaining useful and relevant information by tax authorities and business entities. A number of scientists identifies theoretical and practical issues of monitoring and assessing tax revenues.

In Vaillancourt and Bird (2009), Ball and Foster (1982), Boadway and Flatters (1982), Brummerhoff (2017), Musgrave and Musgrave (1989), Stiglitz (2016), Sasongko et al. (2019) studies the problems of tax management are mainly considered through the influence of external factors on budget stability and balance. The issues of formation, efficiency and effectiveness of budget expenditures in Kazakhstan were investigated by Zeynelgabdin (2018), B.S. Utibaev et al. (2016), Kuchukova (2018) and others.

The transition to the market orientation economy and regional development, the cardinal changes in the sphere of budgetary relations have predetermined the need for new theoretical developments and bringing them to the level of applied use feasibility. The problems of institutional transformations in the region economies and the territorial finances development have been studied by Byrd and Smart (2017), Hagen and Hepp (2016), Ahmad and Stern (2015). The management system control problems were reflected by Andreev (2014), M.I. Bakanov et al. (2018), Belukha (2017), Kashin (2018). The research by Arens and Lobbeck (2015), Podolsky et al. (2016), Skobary (2018), Sheremet and Suits (2015), Dyusenbaev (2016), Ablenov (2017) was devoted to the formation of the conceptual bases of independent audit. Models and technologies of economic analysis and forecasting of the tax system functioning were studied by economists Seidl et al. (2013), Chatagny and Siliverstovs (2015), Krol (2013), Bayer (2015).

4. Empirical results

4.1 The revenues forecast of internal tax on goods, works and services

The most difficult among the possible tasks in tax forecasting is the fiscal and macroeconomic indicators forecast model integration. The aspiration to such integration is very reasonable. The indicators of these models are closely interrelated, and are subject to similar influences of other external factors. The level of income, expenditure and budget deficit directly affects the macroeconomic situation and all the components of the macroeconomic forecast. At the same time, macroeconomic indicators right affect the tax base and the forecast level of any taxes. However, the full integration of these processes is an extremely complex technical task, and therefore is not always acceptable, including by the OECD countries.

Thus, in case of these difficulties, an intermediate solution is applied (between the adoptions of the macroeconomic forecast and attempts to integrate the budget forecast into the macroeconomic model completely). That transitional solution is the "iterative" models, which first calculate the initial macroeconomic forecast, then use it to predict fiscal indicators using simplified methods (extrapolation of past trends, assessment of the effective tax rate, assessment of tax elasticity). After that, the errors are applied to adjust the macroeconomic forecast, and this procedure is repeated several times until the indicators of the two models reach full compliance. However, such econometric approaches are very demanding from a computational and statistical point of view. In Table 1, borrowed from Leal et al. (2018), an overview of the models used by some OECD countries and major international financial organizations are given.

Table 1. Types of models for integrating fiscal forecasting and macroeconomic models

Country and organization	Model Type
United Kingdom (Ministry of Finance)	The fiscal block is integrated into the macroeconomic model
USA (Congressional Budget Service)	Iterative Model
Australia (Ministry of Finance)	Iterative Model
New Zealand (Ministry of Finance)	Iterative Model
Germany (Central Bank)	Reconciliation of models for compliance
Canada (Central Bank)	The fiscal block is integrated into the macroeconomic model
European Commission	The fiscal block is integrated into the macroeconomic model
European Central Bank	Iterative model and separate fiscal block
IMF	The fiscal block is integrated into the macroeconomic model
OECD	The fiscal block is integrated into the macroeconomic model

Source: compiled by authors

Existing methodologies differ mainly in depth and extent of econometric complexity, which determine how well these models are able to replicate the dependence of future tax revenues on various changes in the tax base. In addition, the important aspect is the correlation of the forecast of budget indicators with the prospect of macroeconomic indicators. Since the regions of Kazakhstan are extremely heterogeneous in terms of their economic potential, the republican authorities need a mechanism to assess the level of budgetary provision of the regions, including their tax opportunities. In view of this, it is important that the assessment of the tax potential is primarily related to the assessment of its tax resources. Moreover, tax resources are characterized by the economic structure of the regions. In order to assessing the tax potential, it is necessary to take into account the results of the analysis of actual tax revenues for the past periods, the assessment of performance for the calendar year in which the forecast is made, as well as data on the forecast of changes in macroeconomic indicators. In the studied problems the central position is that, the state budget of the Republic of Kazakhstan is the set of national and local budgets. The analysis of the macroeconomic indicators impact on the state budget tax revenues should begin from the analysis of the dynamics and structure of tax revenues, that to study the equability and to identify possible reserves of growth in the tax revenues collection.

The analysis of tax revenues is based on statistical data of the state budget of the Republic of Kazakhstan. The results show stable positive dynamics of tax revenues for the last 11 years (2007-2017). The amount of tax revenue increased in absolute value for the period from 2007 to 2017 (see Figure 1).

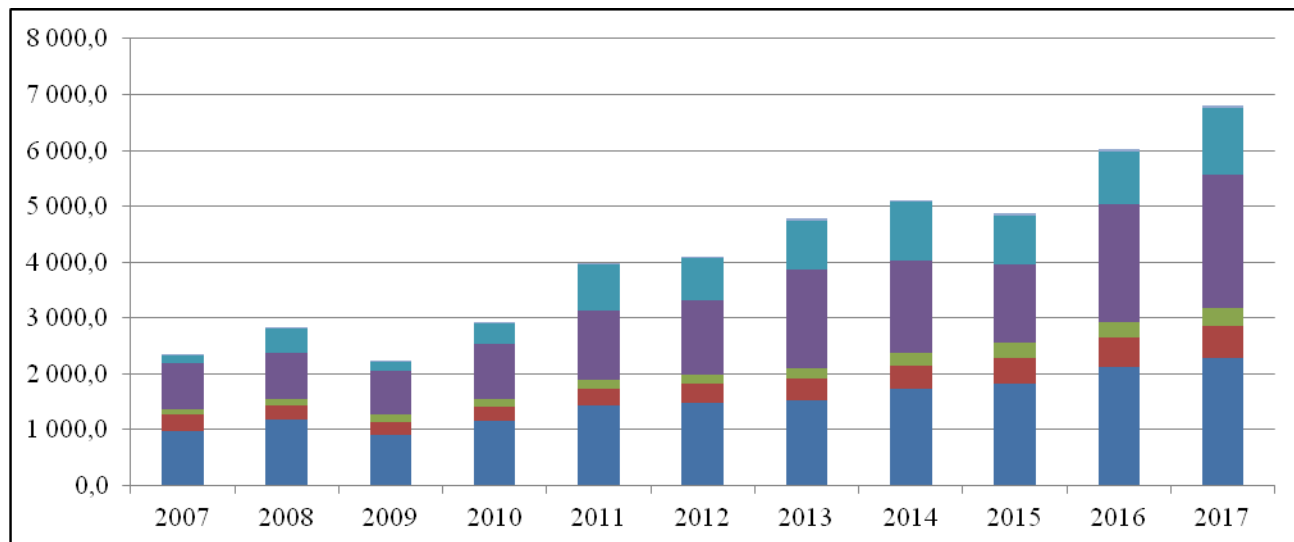


Figure 1. Dynamics of tax revenues in Kazakhstan Republic for 2007-2017, in mln. tenge

Source: compiled by authors according to Official website of the Committee on Statistics of the Republic of Kazakhstan. <http://stat.gov.kz/>

However, the structure of their type in the relative expression has changed. During the period, there is a decrease in the share of basic taxes. So, in 2017 the share of income tax and internal taxes on goods, works and services decreased compared to the basic period by 35% and 34% respectively. The share of tax revenues on international trade and external transactions increased by 2.5 times and amounted to 17.57% (see Figure 2).

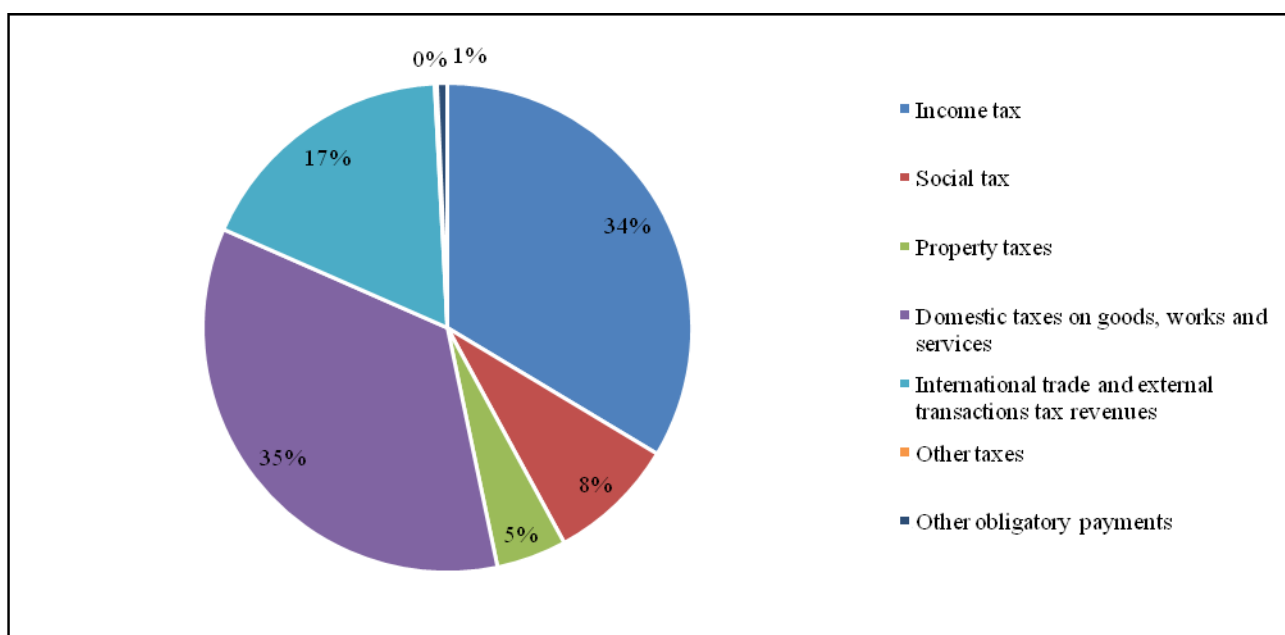


Figure 2. Structure of tax revenues in the Republic of Kazakhstan for 2017, %

Source: compiled by authors according to Official website of the Ministry of Energy of the Republic of Kazakhstan. <http://energo.gov.kz/>

As can be seen from the results, the share of the three main tax revenues (income tax, domestic taxes on goods, works and services, taxes on international trade and foreign operations) for 2017 amounted to 86.01%, and the sample uniformity coefficient is 1.15. The initial data for the analysis of the dynamics and structure of tax revenues are presented in table A1, and the calculation of the equilibrium coefficient of the sample is given in Table 2.

Table 2. Calculation of the equability ratio of tax revenues in Kazakhstan Republic's state budget for 2007-2017

Index	Value
The range of variation	3794,58
Mean Arithmetic Deviation	1069,77
Mean square deviation	1226,57
The ratio of the uniformity of tax revenues	1,15

Source: compiled by authors according to Official portal of State Revenue Committee of the Ministry of Finance of the Republic of Kazakhstan. <http://kgd.gov.kz/>

According to the above analysis, it can be concluded that the assessment of Kazakhstan state budget and the forecasting of its tax revenues can be carried out in three main types of taxes: income tax, domestic taxes on goods, work and services, taxes on international trade and external transactions. The correlation-regression analysis should be conducted to build a tax revenues volume and macroeconomic factors dependence model. First, the Kazakhstan state budget revenues from internal taxes on goods, works and services is considered. The tax revenues amount increases for the period of 2007-2017 (see Figure 3). The hypothesis about the existence of the dependence between domestic taxes on goods, work and services and the total volume of retail trade is considered.

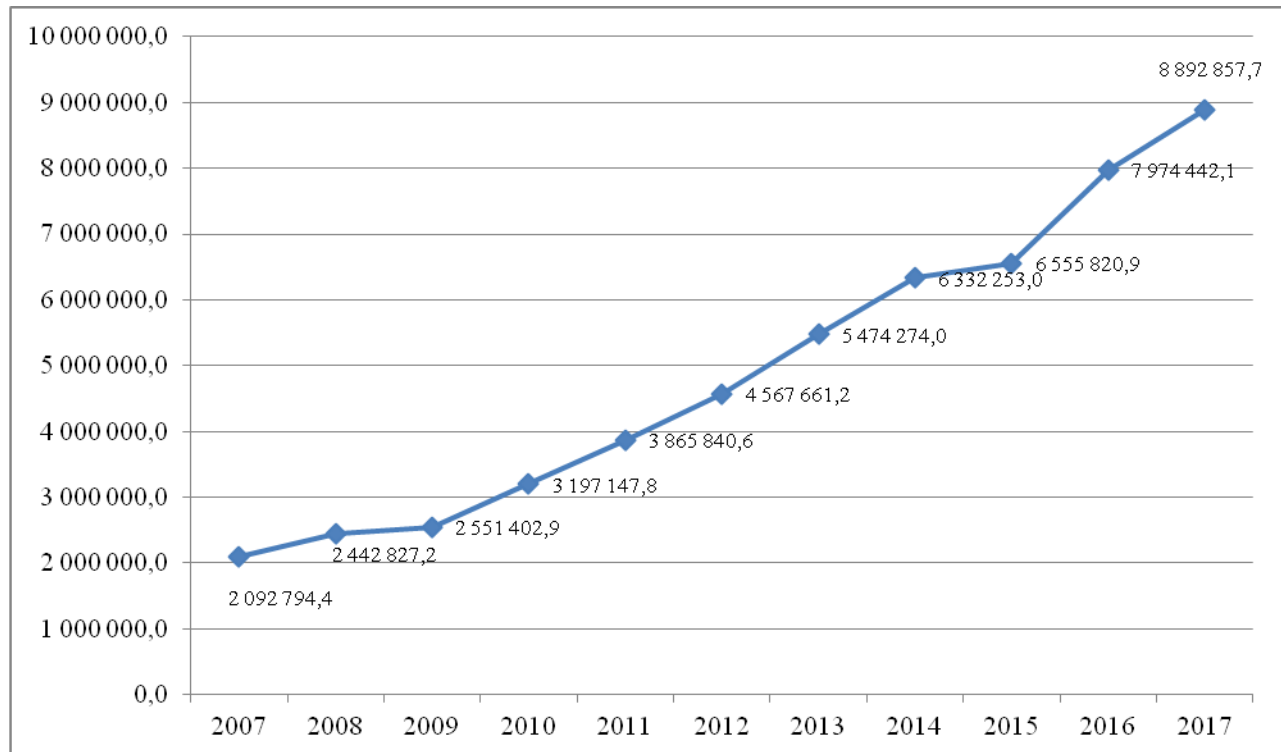


Figure 3. Dynamics of taxes on goods, works and services in the Republic of Kazakhstan for 2007-2017, mln. tenge

Source: compiled by authors Official portal of State Revenue Committee of the Ministry of Finance of the Republic of Kazakhstan.
<http://kgd.gov.kz/>

The initial data for the regression analysis are the quarterly volume of internal taxes on goods, work and services and the total volume of retail trade in Kazakhstan during 2007-2017. The correlation chart between the internal taxes on goods, work and services, and the total amount of retail trade was constructed to visualize the regression analysis (see Figure 4).

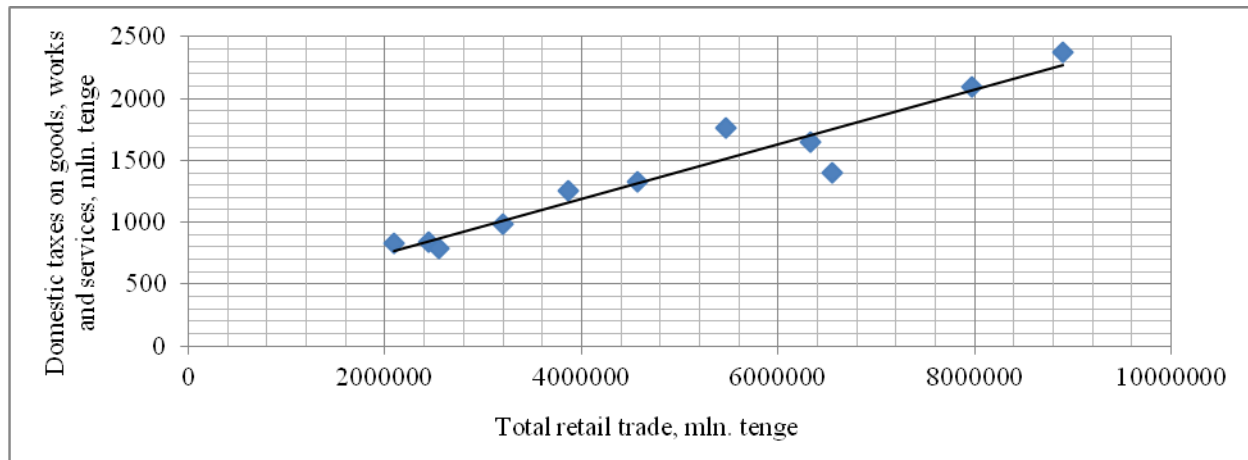


Figure 4. Correlation dependence chart of taxes on goods, works and services from total retail trade in the Republic of Kazakhstan
Source: compiled by authors

Visual analysis of the graph shows the presence of a linear relationship between the studied parameters. In the next stage of the study, it is necessary to construct a matrix of paired correlation coefficients (see Table 3).

Table 3. Matrix of paired correlation coefficients

	Y	X
Y	1	
X	0,93	1

Source: compiled by authors

The correlation coefficient (double R) is close to 1 (0.93), which indicates a strong relationship between the indicators studied. The results of the regression analysis are given in Table 4.

Table 4. Regression statistics of the studied indicators

Regression statistics	
Double R	0,93
R-square	0,87
The normalized R-square	1,29
Standard Error	170,24
Observations	10,00

Source: compiled by authors

The study presents that in 93% of cases the variability of the performance indicator (income from internal taxes on goods, works and services) can be explained by forecasted value of the total retail trade in Kazakhstan. A forecasted value was determined through analytical equalization. The standardized R-square does not significantly differ from the coefficient of determination. It indicates the quality of the proposed hypothesis. During the analysis of the coefficients of Student t-statistics ($t = 170.24 > t = 2.36$), which estimate the ratio of the linear correlation coefficient to the mean square deviation, it is concluded that there is a correlation between the studied variables and the found correlation coefficient is significant. Consider the Fisher's F-criteria coefficients for evaluating the significance of the investigated connection (see Table 5).

Table 5. Evaluation of the significance of the obtained statistical connection

	df	SS	MS	F	Relevance F
Regression	9	1350439	150049	46,60	2,36
Balance	7	202870	28981,4		
Total	16	1553309			

Source: compiled by authors

The equation estimation statistical significance was made by Fisher's F-test. The F-test value table (for significance level $\alpha = 0.05$) is 5.32, which is less than $F = 46.6$. Hence, the statistical significance of the regression equation follows. Consequently, the relationship of income from internal taxes on goods, work and services with the factor included in the analysis is significant. Thus, the following equation describes the forecast of revenues of internal tax on goods, works and services:

$$y = 0,0002x + 354,27 \quad (1)$$

where

y - internal taxes on goods, works and services, mln. tenge,

x - total amount of retail trade, mln. tenge

The correlation between the values (x) and time (t) is illustrated graphically, which determines the kind of the relationship, deriving the trend equation and estimating the value of the R-square. The results of the analysis are shown in Figure 5.

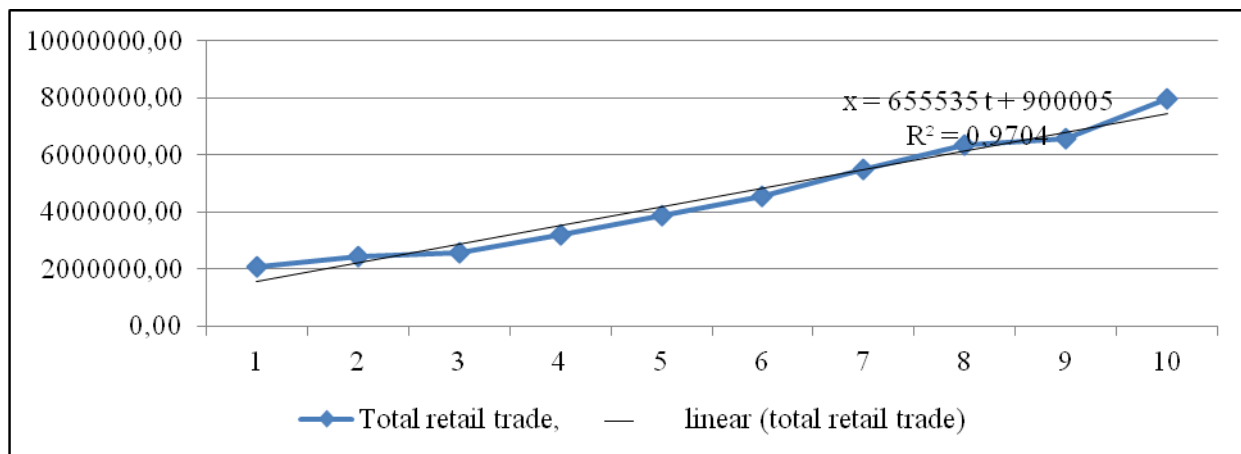


Figure 5. Chart of the total retail trade in Kazakhstan Republic for 2007-2017, million tenge

Source: compiled by authors

Thus, the following equation describing a trend of the retail trade volume in Kazakhstan Republic is obtained:

$$y = 655535t + 900005 \quad (2)$$

The forecast of internal taxes on the goods, works and services revenues on the basis of the resulted dependences are presented in Table 6.

Table 6. The results of the forecast analysis

Scenario	Indicators	2018	2019	2020
Inertial	Total volume of retail trade, mln.tenge	8766425	9421960	10077495
	Domestic taxes on goods, works and services	2107,56	2238,66	2369,77
Optimistic	Total volume of retail trade, mln. tenge	9204746	9893058	10581370
	Domestic taxes on goods, works and services	2195,22	2332,88	2470,54
Pessimistic	Total volume of retail trade, mln. tenge	8328104	8950862	9573620
	Domestic taxes on goods, works and services	2019,89	2144,44	2268,99

Source: compiled by authors

4.2 The revenues forecast of income tax

Secondly, a similar study for the revenues of tax on income was conducted. As can be seen from Figure 6, the revenues of this type of tax have a stable positive tendency to increase. In addition, the linear nature of the variability of this indicator over time is appeared. The null hypothesis of the research was the following: amount of income tax revenues are influenced by such indicators as per capita nominal monetary incomes per capita, output of industrial products (goods and services), and investments in fixed assets. The hypothesis was tested on the basis of correlation-regression analysis. Quarterly indicators of the income tax revenues, average per capita nominal monetary incomes, the volume of industrial products production (goods, services), and investments for fixed capital are the initial data for regression analysis.

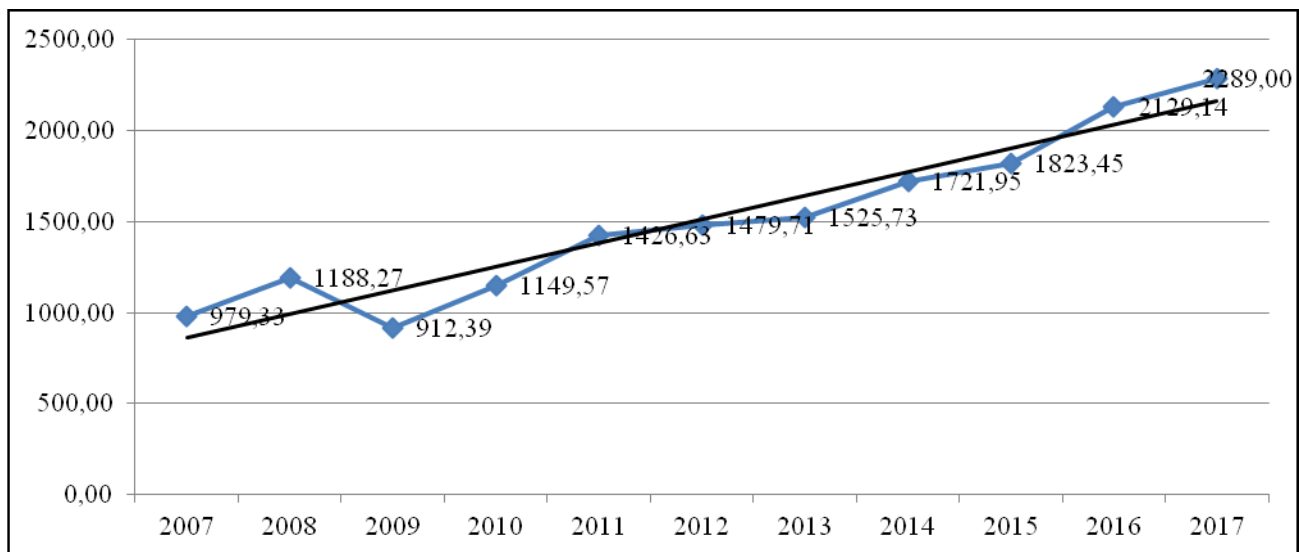


Figure 6. Revenues of an income tax on revenue in the state budget of Kazakhstan Republic for 2007-2017, mln. tenge

Source: compiled by authors

The dependence degree of factors was estimated with the help of correlation analysis. The values obtained are presented in the matrix of paired correlation coefficients (see Table 7).

Table 7. Matrix of pair correlation coefficients of the investigated connection

	Y	X1	X2	X3
Y	1			
X1	0,96932	1		
X2	0,86768	0,88659	1	
X3	0,94988	0,99271	0,84579	1

Source: compiled by authors

The value of the pair correlation coefficients is about 1 (one) and indicates a strong link with the resulting factor, that demonstrates the hypothesis under study is significant. However, as can be seen from the above table, the most link with the resultant factor in parameter X1 (average per capita nominal income). In this regard, we have concluded that it is more appropriate to hold the analysis with factor X1. Correlation chart the revenues of income tax and average per capita nominal income is presented (Figure 7).

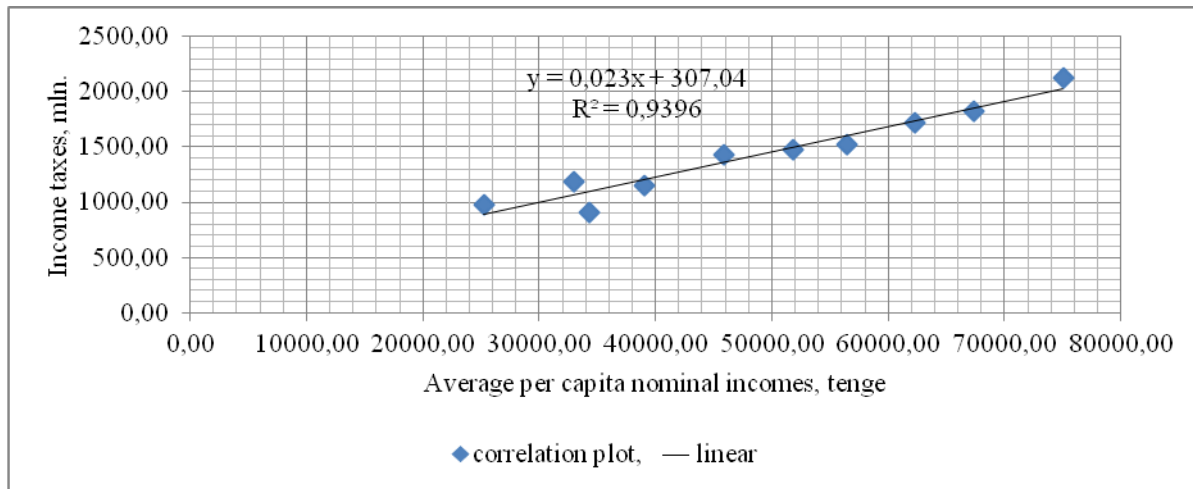


Figure 7. Correlation chart of income tax and per capita nominal income in Kazakhstan for 2007-2017

Source: compiled by authors

Visual analysis of the graph shows the presence of a linear dependence between the studied parameters. Furthermore, in order to evaluate the quality of the hypothesis regression analysis of initial data was performed (table 8).

Table 8. Regression statistics

Regression statistics	
R- paired	0,97
R-square	0,94
The normalized R-square	0,93
Standard Error	100,91
Observations	10,00

Source: compiled by authors

The correlation coefficient (R - paired) is about 1, that assumes strong link between parameters. The coefficient of determination (R-square) shows that in 97% of cases the variability of Y (income tax) due to the predicted value

of nominal per capita income affects. The normed R-square almost equal determination coefficient, which indicates the quality of the proposed hypothesis. According to data, the calculated values of indicators deviate from the actual values by 4.6%. Since the error is less than 7%, this equation is applicable as the regression. The quality of the model was analyzed in the study (Table 9).

Table 9. Analysis of the relation quality

	Coefficients	Standard Error	t-statistics
Y-intersection	307,04	105,92	2,90
X1	0,02	0,00	11,15

Source: compiled by authors

The result of the Student T-test analysis ($t = 2.90 > t = 0.15$) indicates that the dependence between the parameter is significant and the correlation coefficient is significant. Moreover, the P-value was less than 0.05; this also indicates the importance of the resulting equation.

The statistical significance of the estimation equation applying the F-test. The table value of the F-test is 10.1 (for the significance level $\alpha = 0.05$), it is less than $F = 124.42$. Thus, the statistical significance of the regression equation is confirmed. Therefore, the dependence between income tax revenues and the factor included in the analysis is significant. As a result of which, the following equation describing the forecast of income tax revenues is provided:

$$y = 0,023x + 307,04 \quad (3)$$

where

y - income tax revenues, mln. tenge,

x - average nominal per capita incomes, tenge.

According to the regression analysis results, the forecast of income tax revenues until 2020 is presented (Table 10).

Table 10. Forecast values of average nominal monetary per capita incomes of the population and income tax revenues in Kazakhstan for 2018-2020

Scenario	Index	2018	2019	2020
Inertial	Average nominal per capita incomes, tenge.	83968,60	89342,90	94717,20
	Income tax revenues, mln. tenge,	2238,32	2361,93	2485,54
Optimistic	Average nominal per capita incomes, tenge.	88167,03	93810,05	99453,06
	Income tax revenues, mln. tenge,	2334,88	2464,67	2594,46
Pessimistic	Average nominal per capita incomes, tenge.	79770,17	84875,76	89981,34
	Income tax revenues, mln. tenge,	2141,75	2259,18	2376,61

4.3 The forecast of international trade and external transactions tax revenues

Third, revenues from international trade and foreign operations are the next most important tax revenues to the budget. In order to determine sensitivity degree of the factors, correlation and regression analysis and forecast for these tax revenues until 2020 have been performed. There is widespread fact that the main part of domestic export is crude oil. The working hypothesis for the analysis is that there is a dependence between international trade and external transactions tax revenues and value of crude oil and natural gas production. Thus, the initial data for the analysis are the quarterly amount of international trade tax revenues and volume of crude oil and natural gas extraction.

In order to visualize the international trade and external transactions tax revenues data are presented graphically (Figure 8). The trend is highlighted using analytical equalization.

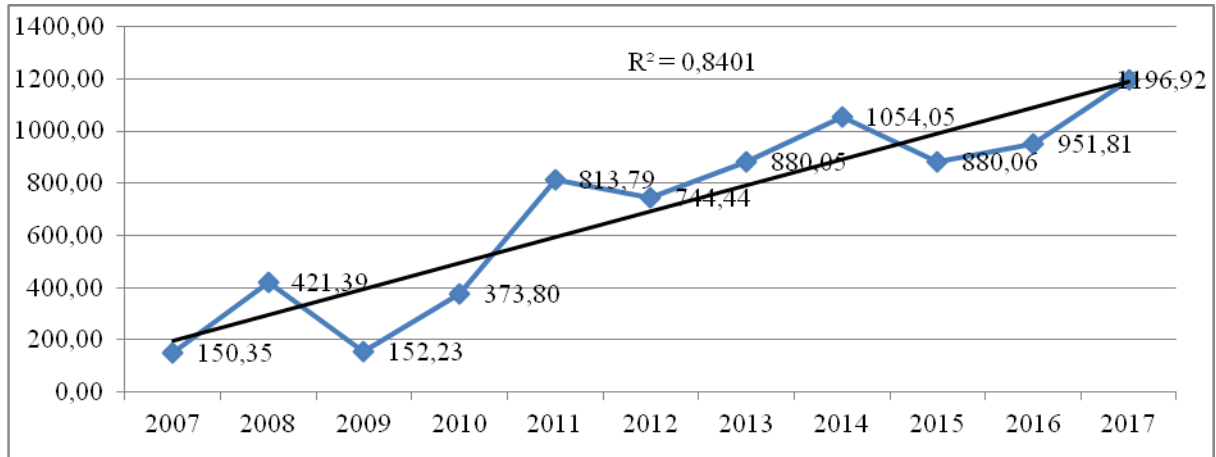


Figure 8. Graphs on international trade and external transactions tax revenues in Kazakhstan for 2007-2017, mln. tenge
Source: compiled by authors

Moreover, the correlation chart between the international trade and external transactions tax revenues and the crude oil and natural gas extraction is presented. (Figure 9).

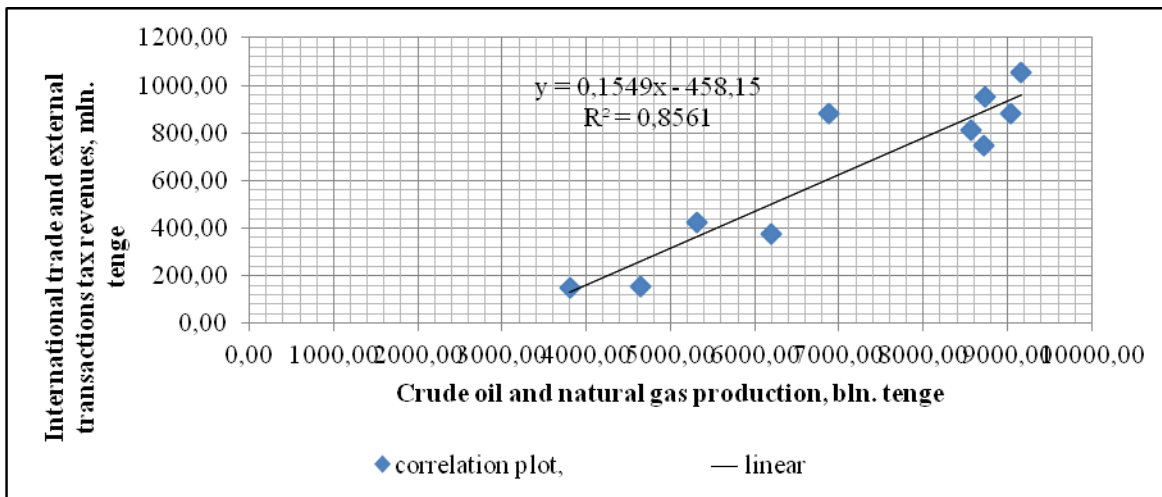


Figure 9. Correlation chart of international trade and external transactions tax revenues and crude of oil and natural gas production in Kazakhstan Republic for 2007-2017
Source: compiled by authors

Graph analysis indicates the presence of the linear dependence between the studied parameters. The regression analysis of the hypothesis is performed (Table 11).

Table 11. Regression statistics of the investigated relation

Regression statistics	
R -paired	0,90
R-square	0,81
The normalized R-square	0,78
Standard Error	144,60
Observations	40

Source: compiled by authors

The correlation coefficient (R -paired) is nearly 1, it means a strong relation between the studied variables. The coefficient of determination (R-square) shows that in 81% of the cases, the variability of Y (international trade and external transactions tax revenues) due to the forecast amount of the oil and natural gas production. The normalized R-square is practically not significantly different from the coefficient of determination. It reveals the quality of the proposed hypothesis. The significance of the hypothesis under investigation was determined by using the coefficient of t-statistics (see Table 12).

Table 12. Evaluation of the studied connection significance

	Coefficients	Standard Error	t-statistics	P-Value
Y-intersection	-482,49	224,27	2,15	0,04
Variable X	0,16	0,03	5,38	0,00

Source: compiled by authors

Based on results of Student's t-statistics analysis, the dependence between the variables and found correlation coefficient is significant. The P-value is less than 0.05, which indicates the significance of the equations. Statistical evaluation of the equation significance was carried out by Fisher's F-criterion.

The table value of the F-test is less than $F = 28.99$. Consequently, the dependence between international trade and external transaction tax revenues and the included factor is significant. Thus, the following equation describes the international trade and external transactions tax revenues forecast:

$$y = 0,1549x - 458, 15 \quad (4)$$

where

y - international trade and external transactions tax revenues, mln. tenge.,

x - crude of oil and natural gas production, bln tenge.

In accordance with the regression equation, a forecast of tax revenues from international trade and external transaction and volumes of oil and natural gas production for 2017-2020 have been presented, using the analytical method of equalization. The graphical representation of the data and the linear trend are shown in Figure 10.

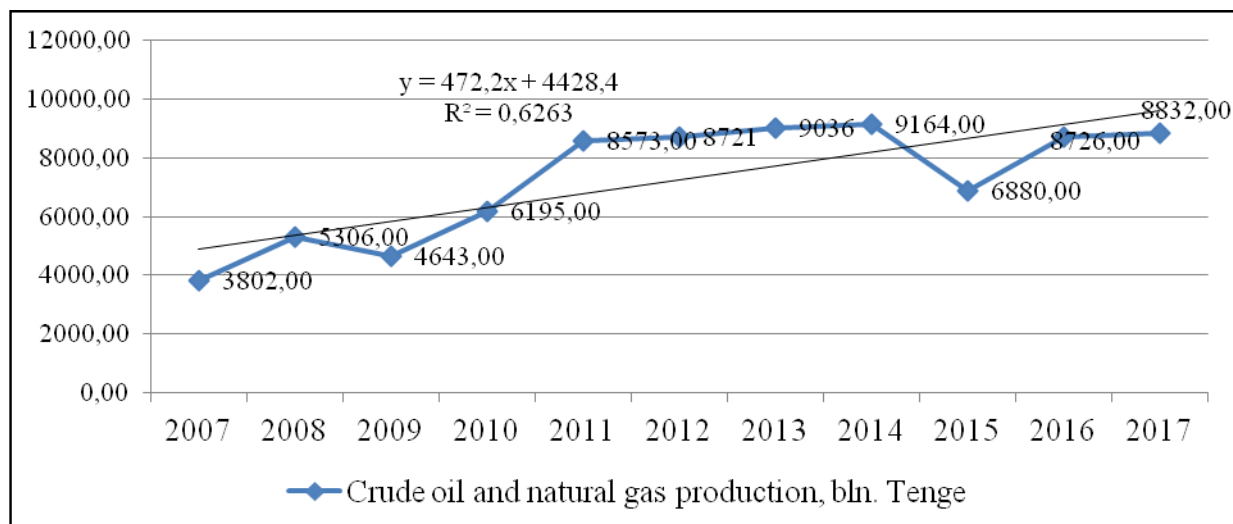


Figure 10. Crude oil and gas production in Kazakhstan Republic for 2007-2017, billion tenge

Source: compiled by authors

In addition, on the basis of the regression equation, the forecast analysis of the studied indicators until 2020 is presented in table 13.

Table 13. Forecast value of crude oil and natural gas production and international trade and external transactions tax revenues in Kazakhstan for 2018-2020

Scenario	Indicators	2018	2019	2020
Inertial	Crude oil and natural gas production, bln. tenge	10516,52	11041,43	11566,34
	International trade and external transactions tax revenues, mln. tenge	1170,86	1252,17	1333,48
Optimistic	Crude oil and natural gas production, bln. tenge	11042,35	11593,50	12144,66
	International trade and external transactions tax revenues, mln. tenge	1252,31	1337,68	1423,06
Pessimistic	Crude oil and natural gas production, bln. tenge	9990,69	10489,36	10988,02
	International trade and external transactions tax revenues, mln. tenge	1089,41	1166,65	1243,89

4.4 . Tax revenues forecast model of Kazakhstan

As the result, the forecast model of dependence of tax revenues on the main macroeconomic indicators is the tool for analysis and planning, as well as a method of subsequent monitoring of forecast data and control of budget replenishment. Moreover, analysis of tax revenues provide increasing information transparency, accountability and competence of tax authorities, rising of external and internal control and state tax audit level.

Table 14. The predictive model of tax revenues and total retail trade, nominal per capita income, oil and natural gas production dependence

Forecast value of tax revenues of the Republic of Kazakhstan
$y_1 = 0,0002x_1 + 354,27,$ y_1 - internal taxes on goods, works and services, mln. tg., x_1 - total amount of retail trade, mln. tenge.
$y_2 = 0,023x_2 + 307,04,$ y_2 - income tax revenues, mln. tenge, x_2 - average nominal per capita incomes, tenge
$y_3 = 0,1549x_3 - 458,15,$ y_3 - international trade and external transactions tax revenues, mln. tenge., x_3 - crude of oil and natural gas production, bln tenge.

Source: compiled by authors

According to the game theory of Nobel Prize winner John Forbes Nash, no one participant can increase the gain by changing their strategy if other participants do not change their strategies. If this theory to the innovative development of regions were applied, the tax potential of the republic would achieve with steady pace of high technologies implementation in each separate sphere. Moreover, according to Deloitte research, stable tax system functioning requires the creation of the transparent structure, which on the basis of aggregation, confirmation and analysis of data will allow to identify deviations and avoid possible risks at the present stage.

Conclusions

Thus, the accurate tax revenues estimation is obtained by a detailed survey and tax audit of all economic activities, including the shadow economy. Among foreign methods the most optimal for budget planning practice in modern conditions of Kazakhstan is the forecast of tax revenues based on regression analysis. This method is especially relevant to develop medium-term plans in case an available sufficient information.

The tax revenues forecast model evaluates possible options for making decisions, to determine the compliance of the received data, also to adjust the potential revenues. The use of analytical tools will ensure an effective tax audit system, which is aimed at the proper functioning, stability and maximum development of tax system. Qualitative analysis and tax audit are necessary components for an assessing information of management decisions, in particular, regulation of tax legislation and further strategic budget planning.

A tax audit based on tax revenues analysis will provide preliminary monitoring; prevent under-limited deviations in a form of tax gap. It ensures the elimination of the adverse events possibility and trends in the state control activity.

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Madina SERIKOVA is PhD student of L.N. Gumilyov Eurasian national university, Nur-Sultan (Astana), Kazakhstan. Research interests: finance, tax audit, economy.

ORCID ID: <https://orcid.org/0000-0002-9832-8885>

Lyazzat SEMBIYEVA is Doctor of Economic Sciences, professor of L.N. Gumilyov Eurasian national university, Nur-Sultan (Astana), Kazakhstan. Research interests: finance, tax audit, economy.

ORCID ID: <https://orcid.org/0000-0001-7926-0443>

Kuralai BALGINOVA is Candidate of economic sciences, Dean of High School of Business and Law Baishev University, Aktobe, Kazakhstan. Research interests: finance, tax audit, economy.

ORCID ID: <https://orcid.org/0000-0002-1295-355X>

Gulzhan ALINA is Candidate of economic sciences, Associate professor of Kazakh University of Economics, Finance and International Trade, Nur-Sultan (Astana), Kazakhstan. Research interests: finance, tax audit, economy.

ORCID ID: <https://orcid.org/0000-0002-1020-415X>

Aliya SHAKHAROVA is Candidate of economic sciences, Associate professor of L.N. Gumilyov Eurasian national university, Nur-Sultan (Astana), Kazakhstan. Research interests: finance, tax audit, economy.

ORCID ID: <https://orcid.org/0000-0001-7522-4445>

Anar Kurmanalina is Candidate of economic sciences of Karaganda economic University of Kazpotreboysuz, Karaganda, Kazakhstan. Research interests: finance, tax audit, economy.

OCID ID: <https://orcid.org/0000-0002-0702-8634>

Register for an ORCID ID:

<https://orcid.org/register>

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**THE IMPACT OF ABSORPTIVE CAPACITY AND INNOVATION AMBIDEXTERITY ON
SUSTAINABLE COMPETITIVE ADVANTAGE: THE CASE OF INDONESIAN HIGHER
EDUCATION***

Astadi Pangarso ¹, Endang Siti Astuti ², Kusdi Raharjo ³, Tri Wulida Afrianty ⁴

^{1,2,3,4} *Brawijaya University, Faculty of Administrative Science, Business Administration Department, Jl. MT. Haryono,
Malang 65145, East Java, Indonesia*

¹ *Telkom University, Faculty of Communication and Business, Business Administration Department, Jl. Telekomunikasi,
Terusan Buah Batu,
Bandung 40257, West Java, Indonesia*

E-mails: ¹ astadipangarso@student.ub.ac.id; ¹ endangsiti@ub.ac.id; ¹ kusdi@ub.ac.id; ¹ twulidafia@ub.ac.id;
² astadipangarso@telkomuniversity.ac.id

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Abstract. The purpose of this study is to empirically examine the mediation role of innovation ambidexterity on the impact of absorptive capacity on sustainable competitive advantage from the previous researchers' data article publication. A survey of academic and non-academic staff from sixty four private higher education institutions (PHEIs) in Bandung, West Java, Indonesia was conducted for the research. A total of five hundred and thirty completed questionnaires from 478 academic and 52 non academic staff were statistically analyzed using SPSS and smart PLS. Investigating sustainable competitive advantage related issues for PHIEs in Indonesia is important for a number of reasons, including supporting the vision of the Golden Indonesia generation 2045. Moreover, the impact of absorptive capacity on sustainable competitive advantage in the literature is remains unclear, thus a new theoretical framework is needed related to the concept of ambidexterity. The finding of this research shows that innovation ambidexterity partially mediates the effect of absorptive capacity on sustainable competitive advantage as proposed in the hypothesis. The implications of this study are discussed.

Keywords: absorptive capacity; innovation ambidexterity; sustainable competitive advantage; non vocation private higher education institutions

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JEL Classifications: M10, C12, C31, C83, C88, C93, D83, I23, N35

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1. Introduction

The industrial revolution 4.0 era, even society 5.0 (Salgues, 2018) characterized by dynamic organizational changes or VUCA (Volatility, Uncertainty, Complexity, Ambiguity) conditions (Xing, Liu, Boojihawon, & Tarba, 2019) that have several impacts including: (1) business competition is getting tougher (Raharjo & Fernandes, 2018). (2) There is a transformation of the business model from traditional business (Rahma, Astuti, Utami, Raharjo, & Arifin, 2018). (3) Organizations must be able to adjust flexibly (Pangarso, 2014). (4) There is a critical role of knowledge (Shahriari, Abzari, Isfahani, & Kianpour, 2018) so organizations can innovate (Raghuvanshi, Ghosh, & Agrawal, 2019). If an organization has a competitive advantage, the organization can at least survive and excel in sustainable competition. Sustainable competitive advantage is influenced by the ability of an organization to absorb knowledge from outside organization to subsequently produce innovations simultaneously between incremental innovation (through the process of exploitation) and radical innovation (through the process of exploration).

The theory that supports the impact of absorptive capacity on innovation is the dynamic capability theory (Teece, Pisano, & Shuen, 1997). Absorptive capacity is part of dynamic capability itself (Zahra & George, 2002). Conceptual research, which also strengthens the next empirical research on the direct influence of absorptive capacity on innovation, have been done by Jurksiene & Pundziene (2016). Jurksiene & Pundziene (2016) suggested the need for empirical research on the direct impact of absorption capacity on innovation.

The direct impact of innovation on competitiveness is accordance with the theory of absorptive capacity (Cohen & Levinthal, 1990). Schumpeter (2003) also strengthen by stating that innovation is the cause of competitive advantage. Previous research by Preda (2014) and Jurksiene & Pundziene (2016) are conceptual research that produces a theoretical proposition that supports the relationship of the influence of innovation on competitive advantage.

This research is essential because it has implications both theoretically and practically. Theoretically, this research contributes to the body of knowledge because it enriches the empirical application of absorptive capacity theory and dynamic capability theory. Also, this research contributes to filling the research gap related to the impact of absorptive capacity & innovation ambidexterity on sustainable competitive advantage (Pangarso et al., 2020).

The practical implications are motivated by practical problems, especially in the context of higher education (HE). President Joko Widodo prioritizes education as an essential sector in Indonesia's development (Biro Kerjasama dan Komunikasi Publik & Kemenristekdikti, 2018). The republic of Indonesia 2019-2024 development theme is "superior human resources, Indonesia becomes a developed country"(Nasir, 2019). Indonesia's development theme can be achieved through education so as to create innovation and increase competitiveness (Keuangan, 2019a, 2019b). The topics of innovation and competitiveness are important topics for education in Indonesia. The total number of students in Indonesia in 2015 was 3.5 million (Afrianty, Burgess, & Theodora, 2015), which continues to increase to a total of more than 7.5 million in November 2018 (Ismunandar, 2019). From the Indonesia's number of students' data further strengthens the importance of the education sector for the Indonesian people.

The number of private higher education institutions (PHEIs) entering the top 100 rankings position of tertiary higher education institutions is still small when compared to the public higher education institution. Also, there is no PHEI that has been placed in the top fourteen or first cluster. Higher education ranking position by Kemenristek Dikti (Indonesian higher education national institution) is essential and reflects the competitive advantage of a higher education institution (HEI) in Indonesia. This is due to the HEI ranking indicators used Kemenristek Dikti / Indonesian Ministry of Research, Technology and Higher Education (Kemenristekdikti,

2018a; Pengetahuan, 2015), is part of the competitive advantage indicator (Organization & Pannen, 2017). The HEI ranking is also in accordance with the RBV theory (Barney, 1991; Templin, 1999; Wernerfelt, 1984) because it consists of resources and capabilities possessed by HEI. These indicators include human capital, institutional performance, student activity performance, research performance, and community service and innovation performance.

In general, the number of PHEIs in Java Island (as the center island of Indonesian HEI) dominates HEI ranking in the non-vocational category. From the Indonesian HEI ranking indicators data obtained information that: (1) West Java province is a province with the largest population in Indonesia (Statistik, 2018) with a composition of the population that potentially requires higher education, which is also quite large (Jabar, 2016). (2) West Java Province is the province with the lowest number (only seven) for the non-vocational PHEI that is included in the 2019 ranking of higher education by Kemenristek Dikti comparing with the other three provinces in Java Island, while the total number of non-vocational PHEIs in the province of West Java is a 250.

The problem of higher education competitive advantage is also experienced by universities around the world regarding innovation and sustainability (Ávila et al., 2017; Girdzijauskaite et al., 2019).

Prof. Dr. Ir H. Eddy Jusuf Sp, M.Si., M.Kom knows the issue of PHEI's competitive advantage in West Java province. As Chief of APTSI Jabar (Indonesian Private Higher Education Institution Association) as well as the former Rector of Pasundan University, Bandung, he stated that: *"there are only five PHEIs in West Java that are competitive."* Prof. Dr. Ir. H. Eddy Jusuf Sp, M.Si., M.Kom statement through the well-known public media in West Java, namely Pikiran Rakyat newspaper in early 2018 (Seftiawan, 2018). There are seven non-vocational PHEIs in West Java province which is ranked 100 universities in Indonesia and all located in the Bandung area (Kemenristekdikti, 2018b; Koran Sindo, n.d.). Then the Bandung area deserves to represent the PHEI of West Java province.

Practically this research contributes to PHEIs decision makers in Indonesia to improve sustainable competitive advantage. Increasing sustainable competitive advantage for PHEIs in Indonesia is vital because contributing to increasing the ranking position of a PHEI, and it is also for a more extensive scope to provide to the preparatory steps to realize the vision of the Golden Indonesia generation 2045 (Nasional/Bappenas, 2019) .

Previous research by Enkel, Heil, Hengstler, & Wirth (2016); Justin J.P. Jansen, (2005); Kohlbacher, Weitlaner, Hollosi, Grahsl, & Gru (2013); Limaj & Bernroider (2017); Noni, Ganzaroli, Orsi, & Roberta (2013); Zou et al. (2018) examined the impact of absorptive capacity on innovation partially (between the four sub-variables of absorption capacity on two of the innovation sub-variables) but have not examined innovation from the perspective of ambidexterity. These previous research have limitation because it is done for a limited context and country, so research needs to be done in different industrial sectors and or countries.

Preda (2014) and Jurksiene & Pundziene (2016) research limitations are not yet done empirically testing related to the impact of innovation ambidexterity on competitive advantage. Preda (2014) states that theoretically, there is a relationship between the impacts of innovation exploration capabilities and the innovation exploitation capabilities on competitive advantage. What distinguishes between the research conduct by Preda (2014) and Jurksiene & Pundziene (2016) is if Jurksiene & Pundziene (2016) examine the impact of dynamic capability on competitive advantage mediated by organizational ambidexterity not by innovation ambidexterity. Because innovation ambidexterity is part of organizational ambidexterity, it is based on research Preda (2014) can be logically related that innovation ambidexterity affects sustainable competitive advantage.

This research fills the research gap from Rao & Thakur (2019) because it is an empirical study of ambidexterity construct for knowledge workers, where the respondents of this study are the people in the formal knowledge

(HEI) environment, namely lecturers (A. Pangarso, 2016). Innovation ambidexterity is a part of the ambidexterity construct that is tested to improve sustainable competitive advantage.

What distinguishes this theoretical framework with previous research are: (1) this research simultaneously links the exploration of innovation and the exploitation of innovation while its predecessor research only connects one of exploration or exploitation. (2) Study conducted by Enkel et al. (2016); Justin J.P. Jansen (2005); Kohlbacher et al. (2013); Limaj & Bernroider (2017); Noni et al. (2013) about the impact of absorptive capacity on innovation is not in different contexts with this research, so this empirical research is expected to contribute to the generalization of theories. (3) This study aims to build and empirically test a new theoretical framework developed by the construct of absorptive capacity, innovation ambidexterity that affects the sustainable competitive advantage that has never been done before for the context of Indonesian non vocation PHEIs as a country with great potential to become one of the developed countries in Asia using multi-respondent. (4) The theoretical framework tested in this study clarifies the process of the impact and prediction of absorptive capacity on sustainable competitive advantage (Pangarso et al., 2020).

Higher education governance in Indonesia has adopted business process principles (Republic Indonesia, 2019). Therefore, it is appropriate for this research to use theories and constructs from the business literature. The research question is, "Does innovation ambidexterity mediate the impact of absorptive capacity on sustainable competitive advantage?". The organization of this paper consists of introduction, literature review, research method, results, discussion, and conclusion. The introduction describes the importance of this research, both theoretically and practically. The originality of this research and the research gap from previous empirical research on this topic are also identified in the introduction section. The literature review puts emphasis on the relevant theories as the basis for the hypotheses development. The research methods explain the data collection method as well as the data analysis. The results section provides the data analysis results, both descriptive statistics and hypothesis testing results. The discussion section provides the interpretation and the significance of the findings related to the research problem and the hypotheses. Lastly, the summary of the research findings and identification of the research limitations as well as some future research agenda were stated in the conclusion section of this paper.

2. Literature Review

Theory

The general theory underlying competitive advantage was first stated by Porter (1985), namely the five forces theory. Porter's theory of competitive advantage tends to use a macro perspective (industry). Next comes the approach of competitiveness that tends to focus more internally first by paying attention to the resources and capabilities of an organization. Beginning with Resource-Based View theory (RBV) (Wernerfelt, 1984), which states that to achieve a competitive advantage, an organization must pay attention and optimize its resources — followed by the concept of Sustainable Competitive Advantage by Barney (1991), which states that to achieve a sustainable competitive advantage, specific resources and capabilities are needed VRIN (Valuable, Rare, Inimitability, Nonsubstitute).

Furthermore, by changing of organizational environments that are increasingly dynamic, new theories emerge, which is named "dynamic capability" (Teece, Pisano, & Shuen, 1997). This theory states that organizations must be able to build, integrate, and configure internal and external capabilities to be able to produce new capabilities to respond to environmental dynamics.

Sustainable Competitive Advantage

Competitive advantage is different from sustained or sustainable competitive advantage. The difference is in terms of the imitation of the unique strategies and values used by business organizations. Sustainable competitive advantage is competitiveness that cannot or is very difficult for competitors to imitate (Barney, 1991).

Innovation Ambidexterity

Innovation is crucial because it is a source of competitive advantage (Preda, 2014). The innovations discussed in this study are innovations from the concept of organizational ambidexterity. The idea of ambidexterity is still a concept that has not been established theoretically, so it opens up opportunities to continue to be used as research variables (Simsek, 2009). The idea of organizational ambidexterity is generally divided into two parts viz: structural ambidexterity (March, 1991) and contextual ambidexterity (Gibson & Birkinshaw, 2004). S. Kortmann (2012) divides the concept of organizational ambidexterity into four types, namely structural, contextual, innovative, and sequential. If related to the dynamic capability theory which used in this study, the most appropriate for the organizational analysis unit is innovation ambidexterity. If the concept of ambidexterity, in general, is still open for research, then the more specific notion of innovation ambidexterity is even more transparent.

From various sources, innovation ambidexterity means, among others: (1) *“ability to simultaneously pursue both incremental [exploitative] and discontinuous [exploratory] innovation”* (Jansen, 2005); (2) *“combining exploratory and exploitative innovations for sustainable superior performance”* (Sebastian Kortmann, 2015); (3) *“a firm's ability to concurrently develop explorative and exploitative capabilities for both radical and incremental innovation”* (J. A. Zhang, Edgar, Geare, & O’Kane, 2016); (4) *“organisational actions of simultaneously leveraging exploratory innovation and exploitative innovation”* (Zang & Li, 2017); (5) *“a combination of two types of innovation capability: explorative and exploitative capability”* (Zhang & Cui, 2017).

The concept of innovation from the perspective of ambidexterity is following the dynamic capability theory (Teece et al., 1997), which states that ambidexterity is part of dynamic capabilities (O’Reilly & Tushman, 2008). The concept of innovation exploration has a radical characteristic of innovation, while the exploitation of innovation has the character of incremental innovation (Preda, 2014).

Absorptive Capacity

Absorptive capacity is a theory put forward by W. M. Cohen & Levinthal (1990) in Mariano & Walter (2015; Miles, 2012). It is defined as *“the firm’s ability to recognize value, incorporate, and exploit new exogenous ideas”* (Nowak, 2017) or the ability of an organization to recognize the value of new information that comes from outside, blend it, form a unique knowledge and apply it to important things directly related to the existence of innovation (Child, 2015). More precisely, absorptive capacity is ‘a slice’ between dynamic capability theory and knowledge-based theory (Vera, Crossan, & Apaydin, 2003). The absorptive capacity theory states the importance of absorbing knowledge from outside the organization so that organizations can be flexible and innovative to improve performance (Miles, 2012) and competitive advantage.

Based on Aprilianti & Alon (2017) stated that the topic of absorptive capacity research is a fascinating topic to be studied can be known from the increasing trend from 1990 to 2015, reaching nearly 3500 publications on the topic. Absorptive capacity entered the top ten research topics in 2015 (Mariano & Walter, 2015). Even if it is related to innovation, which is an absorptive capacity outcome (Zou et al., 2018), then the topic of absorption capacity ranks first in the discussion of innovation (Saatçioğlu, Çaylan, & Ozeren, 2016).

Hyphoteses Development

The direct impact of absorptive capacity on innovation ambidexterity is based on dynamic capability theory (Teece et al., 1997). Ambidexterity innovation is an outcome of absorptive capacity (Jansen, 2005). Absorptive capacity enables organizations to be able to innovate through exploration (radical) and exploitation (incremental) simultaneously (M. Zhang, Zhao, & Lyles, 2018). Klinger (2016), through his literature review, concluded that the higher the absorptive capacity, the more simultaneous explorative and exploitative innovations would be.

Absorptive capacity is the antecedent of organizational ambidexterity (Mardi, Arief, Furinto, & Kumaradjaja, 2016). The five previous studies by Enkel et al. (2016), Jansen (2005), Kohlbacher et al. (2013), Limaj & Bernroider (2017) dan Noni et al. (2013) were linking the absorption capacity of innovation partially (between the absorption sub-variables of the innovation sub-variable) not simultaneously. Justin J.P. Jansen (2005) stated that the interaction of absorptive capacity affects the increased exploration of innovation for the scope of units in an organization. While Enkel et al. (2016) examine the impact between sub variable absorptive capacity on innovation sub-variables with individual analysis units.

The identification have a positive impacts on both the exploitation and exploration of innovation while assimilation has a positive impact only on innovation exploration. Limaj & Bernroider (2017) examine the impact of sub variable absorptive capacity on innovation sub-variables. For the research agenda of the three upcoming studies above, it is suggested research for different industrial domains and or countries, and this opens a gap for researching the Indonesian domain of non vocational PHEIs. The impact of absorptive capacity on innovation ambidexterity is the agenda of future empirical research Jurksiene & Pundziene (2016).

H1: Absorptive capacity has a positive impact on innovation ambidexterity.

The direct influence of innovation ambidexterity on sustainable competitive advantage, including dynamic capability theory (Teece et al., 1997) and supported by statements O'Reilly & Tushman (2008) that ambidexterity is a form of dynamic capability. An organization's competitiveness is influenced by innovation (Nora et al., 2016). Previous research also supports empirical research related to the impact of innovation on competitive advantage, among others by Preda (2014) and Jurksiene & Pundziene (2016). Both of these studies are conceptual studies that produce theoretical propositions that support the impact of innovation on competitive advantage. Future research agenda of Preda (2014) and Jurksiene & Pundziene (2016) suggest that research be carried out both theoretically and empirically related to the impact of ambidexterity on competitive advantage.

H2: Innovation ambidexterity has a positive impact on sustainable competitive advantage.

The indirect impact of absorptive capacity on sustainable competitive advantage is mediated by innovation ambidexterity based on dynamic capability theory (Teece et al., 1997). This indirect impact is a consequence of the two previous hypotheses.

H3: Innovation ambidexterity mediates the positive impact of absorptive capacity on sustainable competitive advantage.

Theoretical framework

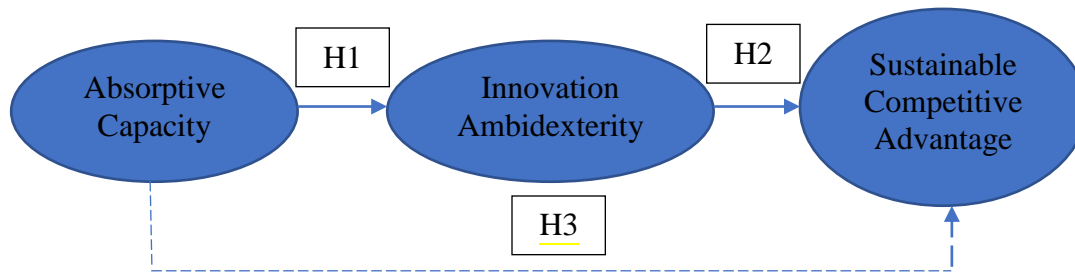


Fig.1. Theoretical framework
Source: (Pangarso et al., 2020)

3. Research Method

This empirical research examines our theoretical framework (Pangarso et al., 2020) based on the collected data in 2019. Thus, this research is considered as an explanatory research that explains the impact among variables studied or commonly referred to as causal research (Newhart & Patten, 2018).

The population of this research is all the non-vocational PHEIs in Bandung area representing West Java province with the total of eighty-one (81) PHEIs. Based on conformity with the background of the study (practical and theoretical problems), the representation of the sample to the population, the ease, accuracy, and availability of data (Newhart & Patten, 2018). The determination of the type of sample method is based on conformity with the background of the study (practical and theoretical problems), the representation of the sample to the population, and the ease, accuracy, and availability of data (Cresswell, 2014).

Each PHEI is represented by at least three categories of respondents representing the PHEI organizations. It is expected that these three categories of respondents can provide a complete perception of the measurement of all research variables. The three types are academic leaders, lecturers, and quality assurance employees (non academic staff). This categorization includes multiple respondent with a purpose: (1) bias minimalization (Burton, Eriksen, Håkonsson, Knudsen, & Snow, 2008; S. Kortmann, 2012; Li, 2013; Liao, Welsch, & Stoica, 2003; Prajogo & Oke, 2016; Soto-Acosta, Popa, & Martinez-Conesa, 2018); (2) increasing validity (Valmohammadi & Ahmadi, 2015), reliability (Blarr, 2012) also (3) provide higher generalization of data processing results (Martinez-Conesa, Soto-Acosta, & Carayannis, 2017). The categorization of respondents with multiple respondents for the university organizational analysis unit has also been carried out by Chang et al. (2016), where one university organization was represented by five lecturers and four heads of administration. Furthermore, the three categories are limited to the conditions of having fulltime employee status for a minimum of three years of work, with the consideration that it will provide more understanding and appropriate answers to the data collected. “Fulltime” definition is working at least 40 hours a week (Menteri Riset & Pendidikan Tinggi, n.d.).

On average, one organization is represented by ten respondents of academic staff and non academic staff (three leaders, five lecturers, and two quality assurance). The leaders consist of 1 rector/vice rector, one dean/vice dean, and one head of study program. Fulltime lecturers with the most composition because lecturers are crucial for HEI (Pangarso, 2016; Pangarso, 2019b). The total number of respondents can be seen in Pangarso et al. (2020) which is total 810.

Processing questionnaire data using descriptive statistics (SPSS) and SEM PLS (smart PLS 3.2.9). Smart PLS used with consideration, among others (Hair, Hult, Ringle, & Sarstedt, 2017) (Ringle et al., 2015) (Pangarso et al., 2020):

1. Can be used to structure complex theoretical models (consisting of many indicators).
2. Can be used for small sample sizes and for data that are not normally distributed.
3. Can be used to test both of explanatory and prediction relationship between variables.

Data collected through a survey using a questionnaire consisting of two parts. The questionnaire consist two parts, the first part aims to determine the characteristics of respondents and the second part aims to determine the perception of respondents regarding research variables. The questionnaire data can be found at supplementary material in appendix (Pangarso, 2019c) in Pangarso et al. (2020).

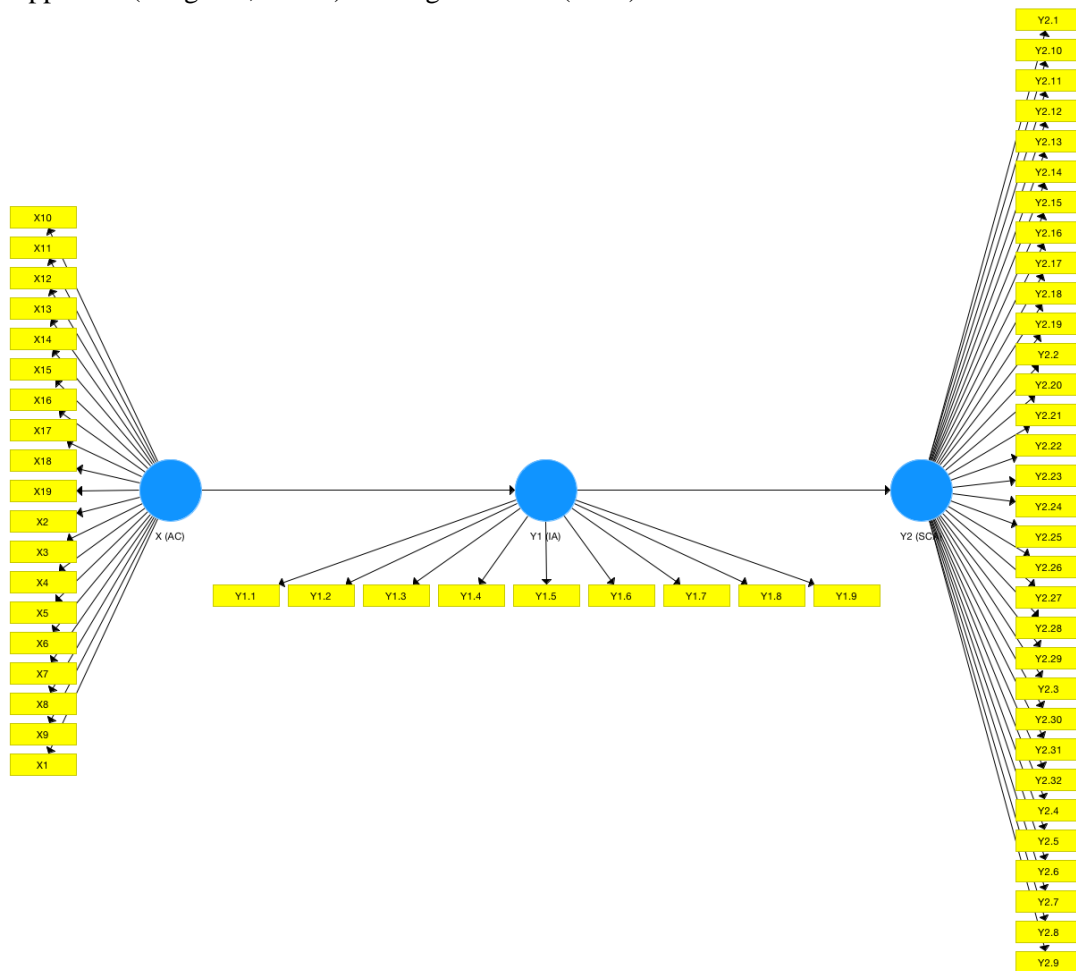


Fig. 2. Smart PLS theoretical framework

Source: smart PLS data processing

4. Results

From eight hundred and ten questionnaires distributed to eighty one PHEIs in the Bandung area, five hundred and thirty questionnaires from sixty-four PHEIs that were eligible to be collected. The first part of research questionnaire had the respondents' characteristics such as: dominated by men with a number that tends to be balanced with women; dominated by masters' degree far more than 50% compared to bachelor and PhDs'; dominated by respondents whose had structural position more than 75% and dominated by lecturers and academic leaders compared to quality assurance position for more than 80%. The amount of sample data collected has exceeded the minimum requirements required by smart PLS (Pangarso et al., 2020). The data are collected from 64 organizations of non-vocational PHEIs and has been meet the Smart PLS minimum sample requirement (Hair et al., 2017). The response rate respondents' questionnaire data collection is more than 65% (Pangarso et al., 2020).

This research questionnaire is self-administrated/self-report (Fernando & Chukai, 2018; Lee & Fernando, 2015). Self-report means that research respondents filled out questionnaires based on their perception of the research variables at the institution where the person concerned worked. Self-report questionnaires can potentially lead to a common method bias. Therefore this questionnaire has gone through a pre-test, pilot test process and needs to be checked whether this research is free from the common method bias (Pangarso et al., 2020). A pre-test is used the expert assessment. The experts are three academician and Ph.D qualification consist of: 1 Professor, 1 Associate Professor and 1 Assistant Professor from related business administration field. After pass the expert judgement, the process continue with the pilot test to check the instruments validity and reliability using SPSS for 40 respondents from 40 non-vocational PHEIs. All of research indicators are valid (the research indicators r-value are more than r-table which is 0.320) and reliable (Cronbach'S alpha value is 0.985). Evaluation of common method variance using the Harman single factor test has been carried out (Podsakoff, MacKenzie, & Podsakoff, 2012), and a variance value below 50% is obtained, the results of the SPSS calculation can be seen in Pangarso et al. (2020) and show that all research indicator are free from bias.

Data for respondents' perceptions, smart PLS measurement also structural model processing results on the second part questionnaire can be seen in Pangarso et al. (2020). Smart PLS process begins from evaluating the measurement model (outer model) consist: internal consistency reliability, indicator reliability, convergent validity, and discriminant validity (Hair et al., 2017) in Pangarso et al. (2020). The results of indicators which pass the the run the show of thumb assessment of internal reliability, construct validity, and discriminant validity can be seen within the table 2.

Table 2. Research variable pass the smart PLS measurement model rule of thumb

Variable	Description of Indicator Item
Absorptive Capacity	Frequency of cooperation with other organizations (X3.)
	The impactiveness of the competency improvement program internally (X4.)
	The ability to assimilate new technology and innovation (X5.)
	The ability to use various knowledge, competencies, and experience (X6.)
	Ability to develop knowledge management programs (X10.)
	The importance of the ability to respond to competitive pressures (X12.)
	Ability to adjust the designed technology (X13.)
	Transfer of scientific and technological information (X14.)
	The ability to coordinate and integrate all stages of the R&D process (X15.)
	Organizations can use and exploit new knowledge from the outside of organization (X16.)
	Priority use of technological knowledge and experience (X17.)
	Organizational awareness of its competence in innovation (X19.)
Innovation Ambidexterity	There is a search for innovative solutions related to technology ('out of the box') from the outside of organization (Y1.1.)
	Innovation in the quality of research and knowledge transfer (Y1.5.)

Sustainable Competitive Advantage	Incrementally improve the quality of research and knowledge transfer (Y1.6.)
	Incrementally increasing efficiency (Y1.7.)
	Incrementally increasing the reliability of research results and knowledge transfer (Y1.8.)
	Incrementally increasing automation in research operations and knowledge transfer (Y1.9.)
	VRIN (Valuable, Rare, Imitability, Nonsubstitute) information management system (Y2.9.)
	The presence of international students has fulfilled the minimum requirements of the Ministry of Research, Technology and Higher Education related to tertiary ranking (Y2.17.)
	The ability of universities in marketing activities (Y2.18.)
	ISO higher education certification (Y2.20.)
	The ability of universities to design competitive organization (Y2.21.)
	The number of student achievements has met the minimum requirements of the Ministry of Research, Technology and Higher Education related to non vocation HEI ranking (Y2.24.)
	The performance of student organizations has met the minimum requirements of the Ministry of Research, Technology and Higher Education related to non vocation HEI ranking (Y2.25.)
	The research performance has met the minimum requirements of the Ministry of Research, Technology and Higher Education related to non vocation HEI ranking (Y2.26.)
	The number of Scopus indexed scientific articles per lecturer per year has met the minimum requirements of the Kemenristek Dikti regarding non vocation HEI ranking (Y2.28.)

Source: (Pangarso, 2019c)

The HTMT detailed calculation results can be seen in Pangarso et al. (2020) show that the research variable have a good discriminant validity. After evaluating the measurement model, then proceed to the structural model evaluation process (inner model). Guidelines for structural evaluation models, according to J. F. J. Hair et al. (2017), consists of : VIF, R^2 , Q^2 plus PLS predict (Shmueli et al., 2019) and IPMA.

Inner VIF detailed calculation results can be seen in in Pangarso et al. (2020) and show that all research variables are free from colinearity problems.

Smart PLS R^2 & Q^2 calculation detailed results can be seen in Pangarso et al. (2020) shows that the structural model has medium explanatory power and predictive relevance.

For PLS predict, the Q^2 predict value for all indicators shows values above 0 means that the structural model has predictive power. Furthermore, the majority of the RMSE PLS values are smaller than the LM RMSE value, which means that the structural model has moderate predictive accuracy (Shmueli et al., 2019).

Table 3. Smart PLS PLS predict

	PLS Q^2 predict	RMSE	
		PLS	LM
Y1.1	0.477	0.604	0.601
Y1.6	0.410	0.558	0.564
Y1.8	0.468	0.537	0.545
Y1.9	0.461	0.558	0.571
Y1.7	0.317	0.592	0.606
Y1.5	0.498	0.592	0.596
Y2.20	0.379	0.666	0.666
Y2.26	0.320	0.633	0.644
Y2.28	0.360	0.655	0.642
Y2.17	0.306	0.684	0.673

Y2.18	0.401	0.598	0.591
Y2.25	0.350	0.615	0.608
Y2.9	0.339	0.702	0.678
Y2.21	0.373	0.612	0.618
Y2.24	0.298	0.630	0.639

Source: Smart PLS PLS predict calculation result

The results of processing smart PLS data via bootstrap 5000 samples (Hair et al., 2017) shows that all hypotheses are accepted, both the significance and relevance of the path coefficient indicate a p-value of less than 0.05. From Pangarso et al. (2020), it can be seen that the direct impact with the biggest coefficient is the positive impact of the absorption capacity on innovation ambidexterity. Absorptive capacity is proven to have a positive impact on sustainable competitive advantage both directly and indirectly through the mediation of innovation ambidexterity. Since all path coefficient values are positive, the impact of mediation innovation ambidexterity is in the category of partial complementary mediation (Hair et al., 2017). The smart PLS hypotheses testing calculation results can be seen in Pangarso et.al (2020).

Table 4. Hypothesis testing result

Hypothesis	Supported
H1	Yes
H2	Yes
H3	Yes

Source: Pangarso et al. (2020)

From the IPMA graphic image in Figure 5 & 6 also Table 5, it is found that the contribution of performance and importance of the variable absorptive capacity and innovative ambidexterity to sustainable competitive advantage is well-positioned. Still, the innovation ambidexterity variable has an essential role beyond absorptive capacity. Meanwhile, if viewed from the perspective of the indicator, all indicators of innovation ambidexterity variables appear to have a critical influence function on the sustainable competitive advantage that exceeds almost all indicators of absorptive capacity.

Table 5. IPMA calculation

	LV Index	LV Performance
Absorptive Capacity	3.791	69.767
Innovation Ambidexterity	3.805	70.118
Sustainable Competitive Advantage	3.721	68.029

Source: Smart PLS IPMA calculation result

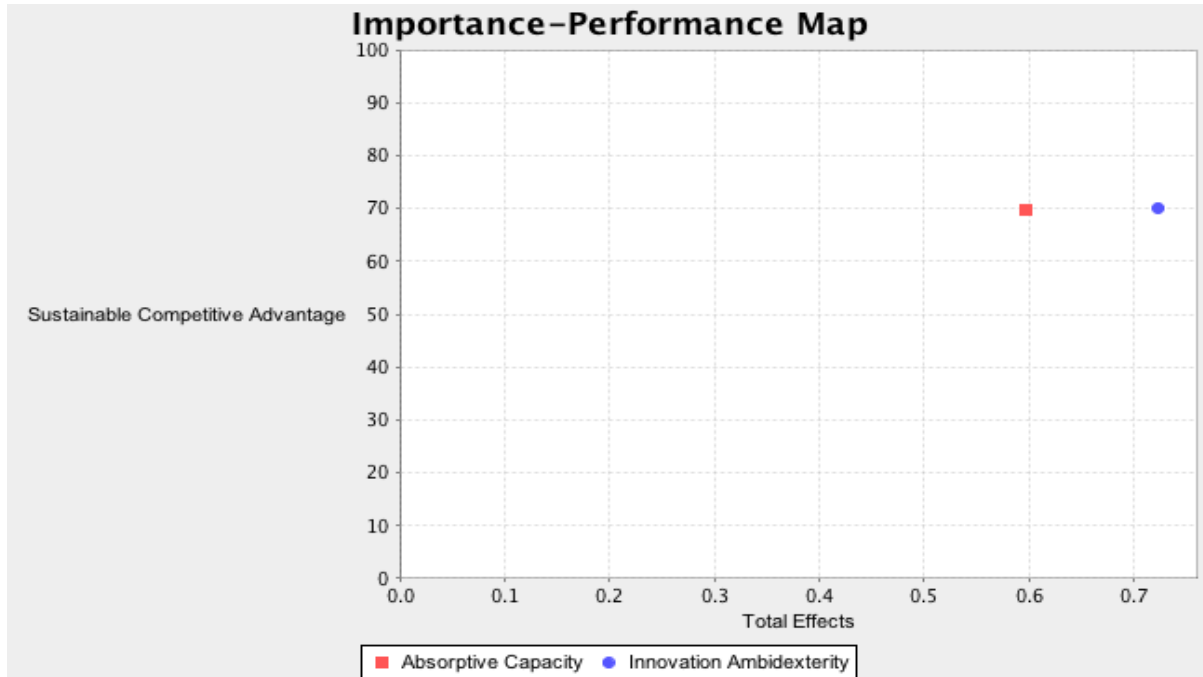


Figure 5. Smart PLS IPMA graphic result for variables
Source: smart PLS IPMA calculation result

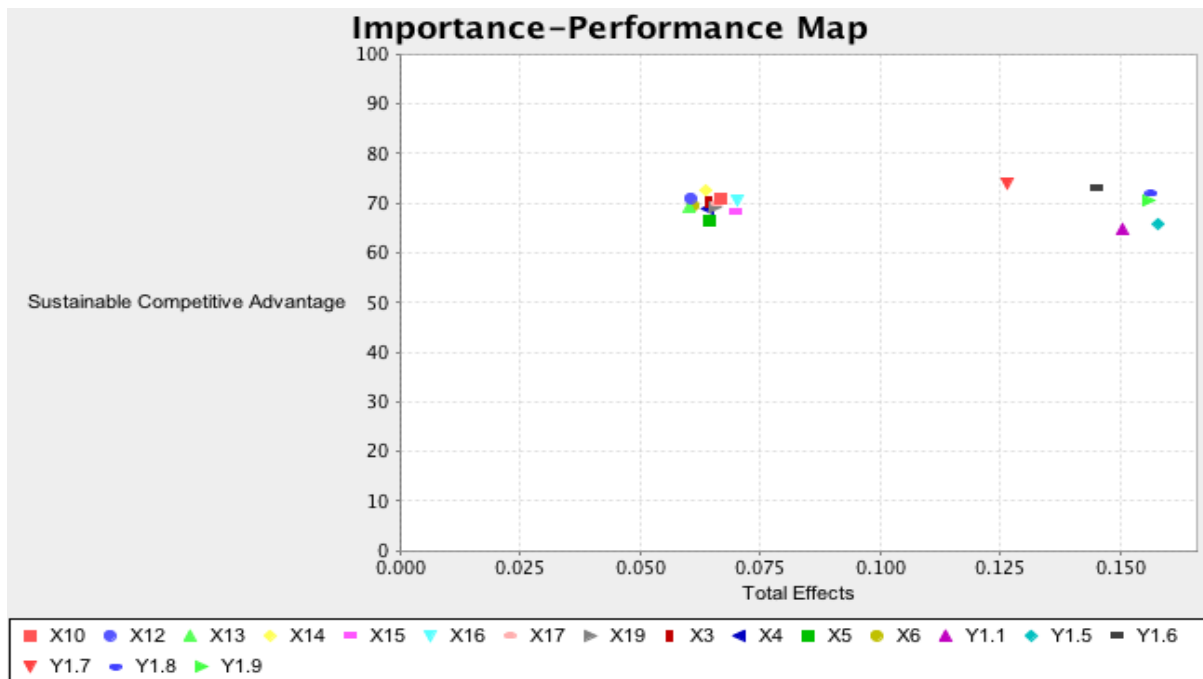


Figure 6. Smart PLS IPMA graphic result for indicators
Source: smart PLS IPMA calculation result

5. Discussion

All research hypotheses are proven to be support (Pangarso et al., 2020). This is because statistically, it can be seen that the p-value of each hypothesis is below 0.05; more precisely, all hypotheses have a p-value of 0 either directly or indirectly impacts. In addition to the p-value significance also see the statistical value whose value must be above 1.96. The t value of statistics for all hypotheses shows that it has been more than 1.96. The hypothesis with the most excellent influence value is on H1, then H2 and H3, respectively. This is due to the value of the H1 path coefficient, which has the most exceptional value compared to other hypotheses.

The implications of the results of this data processing consist of theoretical and practical implications. The theoretical implications of this study also clarify the process of influence between absorptive capacity on sustainable competitive advantage. The indirect impact of absorptive capacity on sustainable competitive advantage through mediation innovation ambidexterity supports the theory of absorptive capacity and dynamic capability. By increasing the ability of an organization to absorb external knowledge, it influences the increase in innovation produced by exploration and exploitation to create a sustainable competitive advantage for non vocation PHEIs.

The positive and direct impact of absorptive capacity on innovation ambidexterity supports the theory of dynamic capability (that absorption capacity is part of dynamic capability and also innovation is the outcome of absorptive capacity). Empirical findings on the impact of absorptive capacity on innovation ambidexterity have filled the research gap Jurksiene & Pundziene (2016). The ability of an organization to absorb knowledge from the outside to be applied internally is proven to increase innovation produced by organizations both obtained exploitatively and exploratively. The practical implication related to this finding is that PHEIs are advised to pay close attention and examine the condition of its absorptive capacity. Part of the absorptive capacity with the highest value loading factor is "the organization can use and exploit new knowledge from outside." The importance of private universities to be able to gain new knowledge from outside and use it for the realization of innovation. PHEIs are expected to 'open themselves' in collaboration with various parties outside their organizations, primarily related to the latest knowledge both online and offline. Whereas the most part of innovation with the loading factor is "Incrementally (gradually) increasing the reliability of research results and knowledge transfer." HEI innovation is more exploitative than explorative. PHEIs can gradually produce reliable research, and after that, the research results can be disseminated both academically and publicly. To be able to increase the impacts of constant study and spread gradually, it is also related to the opening of relations with parties outside the campus. Universities and colleges actively both online and offline participate in activities directly related to improving the quality of research and publications, specially with industry. This is important because this is where a transfer of knowledge from outside to inside and vice versa will be realized so it can directly influence the quality of research and publication.

The positive direct impact of innovation ambidexterity on sustainable competitive advantage supports the theory of dynamic capability. The findings of the empirical influence of innovation ambidexterity on sustainable competitive advantage have filled the research gap of research Preda (2014) also Jurksiene & Pundziene (2016). With increasingly simultaneous innovations produced both exploitatively and exploratively, it has been proven to increase sustainable competitive advantage. The practical implication is that private universities need to pay attention and provide incremental and radical innovation. However, the emphasis of innovation here tends to be incremental rather than radical because the number of innovation indicators that pass the loading factor test is more exploitative (incremental) than explorative (radical). Innovations obtained through the process of exploitation from within the organization (internally) gradually by modifying existing innovations. This exploitative innovation also results in an increasingly sustainable competitive advantage. The highest value of loading factor sustainable competitive advantage is in the item "ISO HEI certification." ISO certification has detailed indicators that are recommended to be met by a tertiary institution. If the organization has innovated both

exploratory and exploitative, then it can contribute to the realization of an organization having ISO certification. If a college has certification ISO 21001:2018 ("ISO - ISO 21001:2018 - Educational organizations — Management systems for educational organizations — Requirements with guidance for use," n.d.) clearly, this is a guarantee of the quality of a PHEI. If a private university has received the ISO certification, it is likely that the national ranking of the Ministry of Research and Technology (Kemenristek Dikti) can also be fulfilled, and can even be included in ranking 1 cluster. The challenge related to this ISO is the need for substantial financial resources, which not all PHEIs have because an essential part of the ISO standard that is met is in terms of physical infrastructure.

From the introduction, it can be seen that from a total of 250 PHEIs in the West Java province, only 7 entered 100 HEI rankings in Indonesia. It can be assumed that only seven PHEIs have a sustainable competitive advantage. Bandung region is considered sufficient to represent the West Java province, the Bandung region data can be used to capture the conditions of the West Java province. Data obtained from the Higher Education National Data Provider Forlap shows that 18 PHEIs in Bandung are categorized as "big" while 63 others are in the "small" category. This categorization is seen from the total number of students. PHEI, which is categorized as "big", is assumed to have more considerable resources than "small" so that there is a higher chance of having a sustainable competitive advantage. The seven PHEIs referred to fall into the "big" category. It is a challenge for the existing "small" private higher education institution with limited resources to have the ability to absorb knowledge from the outside to further produce innovation from the exploitation process so that it can enter the national ranking in Indonesia (has a sustainable competitive advantage). Specific challenges for managing foundations, leaders of the "small" campus, and LLDIKTI (Indonesian Private Higher Education Administrator Institution) (Pangarso, 2019a) to realize the ability of absorptive capacity that can produce innovation ambidexterity. Open science is expected to contribute and be an alternative solution to the problem of limited financial resources experienced by "small" PHEIs. This opens an opportunity for future research on the role of open science practices to improve the impactiveness of "small" PHEI's knowledge administration and competitiveness.

Conclusions

This research provides the answer to the research question of whether or not innovation ambidexterity mediates the impact of absorptive capacity on sustainable competitive advantage. It is clear from this research that innovation ambidexterity plays a partial role in mediating those two variables. Since this research only applied to non-vocational PHEIs, future research that include both non-vocational and vocational PHEIs is needed to give a better understanding on the PHEIs in Indonesia. The research model of this study allows to be tested in the future with a structural model with a Higher-Order / Second Order (HCM) since it has a sufficient number of indicators and have theoretical background. In addition, the organizational environment dynamics and knowledge infrastructure are two interesting variables to be both theoretically and empirically studied in the future in the links between absorptive capacity and sustainable competitive advantage.

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Appendix

Supplementary data to this article:

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Astadi PANGARSO is a doctoral candidate at Brawijaya University, Indonesia. He is also an assistant professor at Telkom University, Bandung, Indonesia and teaches organization theory and organization behavior. His dissertation research focus in sustainable competitive advantage organization study (from perspectives of innovation, knowledge and ambidexterity). His duties in this study are: Conceptualization; Methodology; Investigation; Writing – Original Draft; Writing – Review & Editing. Research interests: Organization Theory, Organization Studies.

ORCID ID: orcid.org/0000-0001-9189-0122

Endang Siti ASTUTI is a Professor of Information Technology System at Brawijaya University, Indonesia. At the Faculty of Administrative Science, she teaches management of information system; entrepreneurship and innovation management; information technology governance; strategic information system. She is well known as an expert in management of information system, technology and innovation. Her duties in this study are: Conceptualization; Methodology; Writing – Review & Editing; Supervision.

ORCID ID: orcid.org/0000-0003-3283-7342

Kusdi RAHARJO is an Associate Professor at Brawijaya University, Indonesia. At the Faculty of Administrative Science, he teaches entrepreneurship and innovation management; human resource management and organization theory. He is well known as an expert in organization studies and competitive advantage. His duties in this study are: Conceptualization; Methodology; Writing – Review & Editing; Supervision.

ORCID ID: orcid.org/0000-0003-4319-0644

Tri Wulida AFRIANTY is an Assistant Professor at Brawijaya University, Indonesia. At the Faculty of Administrative Science, she teaches human resource management and organization behavior. She is well known as an expert in workfamily balance study. Her duties in this study are: Conceptualization; Methodology; Writing – Review & Editing; Supervision.

ORCID ID: orcid.org/0000-0002-8746-4718

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STAFFING SEARCH AND RECRUITMENT OF PERSONNEL ON THE BASIS OF ARTIFICIAL INTELLIGENCE TECHNOLOGIES*

Alena Borisova ¹, Madina Rakhimberdinova ², Elvira Madiyarova ³, Inna Riazantseva ⁴,
Natalia Mikidenko ⁵

¹Novosibirsk State Technical University, 20 Prospekt K. Marksa, Novosibirsk, Russia

^{2,3,4} D. Serikbayev East Kazakhstan State Technical University, 69 Protozanov Street, Ust-Kamenogorsk, Kazakhstan

⁵ Siberian State University of Telecommunications and Informatics, 86 Kirova Street, Novosibirsk, Russia

E-mails: ¹ bborisova2012@yandex.ru ; ² rmu_uk@mail.ru ; ³ emadiyarova@mail.ru ; ⁴ zentr_riv@mail.ru ;
⁵ nl_nsk@mail.ru

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Abstract. The key reasons for the transformation of the domestic labor market and the grounds for changing approaches to the formation of staffing are identified. The development of technological solutions to automate the functions of attracting applicants and the primary diagnosis of their suitability to the requirements of the position and organization are presented. A comparative analysis of the possibilities provided by technological solutions for automated search and attracting candidates is given. The problem of search specialization and interaction with the target audience is highlighted. The description of the technological solution for work with the expanded market offer on the basis of point response to information on the offer of a new working place is offered. The article describes the content of the technology and presents a new algorithm for the domestic market search and work with the target audience. Intelligent search and evaluation of the suitability of the applicant in the new technological solution is based on the information trail left by the person in the network.

Keywords: staffing; search and recruitment tools; technology; labor market analysis; closing a vacancy

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1. Introduction

Domestic practice of staffing formation is passing a stage of active development. Strategies and concepts of organizations to identify the need for personnel are being transformed, approaches to position an employer's HR brand are being changed, and traditional ways of attracting and selecting applicants are being improved. The need to test new channels and methods, as well as digitalization of diagnostic tools of the applicant's professional suitability is due to significant reasons (Boikova and Lapshina 2018).

Firstly, rapid changes in business conditions and the need to adapt to them happen almost non-stopping (Borisova 2016; Chehabeddine, Tvaronavičienė, 2020; Lincényi, Čársky, 2020). As a result, the priority for companies often appears to be tools for point response to emerging problems embedded in the management system.

Secondly, the business focuses on the return of investments on resources. The return of investments in the formation of personnel depends on the degree of impact on the target audience, the differentiation of which involves the use of a diverse arsenal of means of communication. Therefore, the means of formation also need differentiation and justification of the impact/payback for different target groups (Butsyk and Demenenko 2018).

Thirdly, the increased selectivity of staff in choosing an employer and, as a result, the struggle of employers for the right employees, especially in the labor market has place. Employment strategies implemented on the market today are more flexible and mobile (Danishina and Vasilenko 2016). The change of generational groups also increases the significance of this cause. Employees of generation Z are extremely selective in the choice of work and organization, as a result, the competition for employees between employers increases (Demenenko and Sarkisyan 2017).

The identified reasons indicate the demand for the market to improve traditional tools of staffing. Criteria for improvement include the following: the speed of closing a vacancy, the breadth of the target audience, the cost of recruitment and selection, the reliability of data; the predictive value of the hiring decision and the retention of new employees in the organization.

It seems relevant to conduct:

- a review of existing and developing technological solutions to improve traditional staffing tools;
- an assessment of technological solutions to meet the above criteria and the definition of niches for innovation;
- an analysis of successful / not successful practices in the use of new technologies;
- an assessment of development prospects and ways to prevent / overcome threats to the functional area of "recruitment", implemented by traditional instrumental solutions in the HR departments of companies.

The intent and the logic of this article research are defined by these objectives (Glupenykaya 2014).

2. Research background

The staffing issues of the company are at the junction of many disciplines: Human Resource Management, Labor Economics, Personality Psychology, and General Management. The list of interdisciplinary interaction has recently included information areas, i.e. artificial intelligence technologies, tools for processing big data and process modeling, tools for building artificial neural networks and predictive analytics. The basis of traditional approaches to the formation of the company's staffing is to diagnose to what extent a candidate's professionalism and personal qualities are in the compliance to the requirements of the position of the company on the basis of a direct appeal to the participants of interaction – the applicant or employer. The response to a vacancy or a request for a resume, announced on the job site, is the starting stages of launching the staffing process (Andonova, Nikolova, Dimitrov 2019).

Information technology greatly enriches the tools for diagnosing the suitability of the applicant and the selection of employees. So, video resumes, interviews via Skype, the initial selection and communication via instant messengers and chat-bots have become habitual and traditional.

The empirical data confirming high efficiency of using new information tools in processes are accumulated: attracting applicants through social networks; positioning the employer in the labor market and improving the employer's HR brand; relocation of talents and formation of personnel reserve; selection of employment channels and the effectiveness of this choice for applicants and organizations; the diagnostic suitability of a specific job, including the job interview and building a profile about the suitability of the means of neurophysiology; generation and growth of conversion funnel selection of applicants (Cassela and Hanaki 2016).

The use of such tools can reduce the resource support for the selection of personnel and expand the territorial localization of participants, increase awareness of the company in the labor market, and contributes to the targeted search for an employer or a specialist (Mansurov 2018).

However, in the referred works the main emphasis is placed on enriching the traditional approach to the formation of staffing organization tools that replace manual labor of a HR-Manager. This article focuses on the presentation of new information tools that expand the traditional vision of the company's staffing: the search in the mode of direct response of interaction participants to employment requests is replaced by technologies that allow forming demand and supply of labor in the online mode without announcing the need for interaction. Thus, the use of the following technologies allows you to expand the volume of supply of the labour market and to significantly reduce the asymmetry of information interaction of the participants – the employer and the applicant.

In our opinion, it is significant that new information technologies expand the traditional approach to staffing, as it becomes possible to find a candidate and an employer without a direct request for the need: at work or a new employee. And the results of using such technologies allow us to speak not only and not so much about saving resources, but also about the quality growth of the formation of the company personnel.

3. Market review of technological solutions for searching and selecting target applicants for the organization

The speed of processes automation of and functional depends on:

- the interest of developers, service user- companies and, finally, startup innovators ready to invest in development;
- readiness of the environment and people to perceive technological solutions and evaluate the benefits of their use;
- the scale of financial investments in development.

Studies show that the domestic market is significantly behind the speed of development and implementation of the global pace (Ananeva 2016). There is significant growth potential over the coming years. The market with high attractiveness for investors and developers has been differentiated. The specialization of companies in automated functional areas of HR-management is defined according to the breadth of management tasks.

Automation of selection, despite the already long history of formation, is being significantly modernized in the present : the shift of focus from traditional tools built into a single management system to local solutions that allow to solve deeper the narrow problem of finding, attracting personnel and diagnosing their professional suitability is fixed. Analysis of key developers of automated technologies for search, attraction and primary diagnostics of applicants (Table I) found that almost all platforms implement a similar scheme of generating the input flow of applicants – through the collection of resumes from job sites and social networks. Accordingly, all solutions apply to almost the same initial database of applicants. This leads to greater competition in the demand

market, and as a result, makes the position of applicants more advantageous for a set of requirements for the employer (Khoreva, Vaiman and Kostane 2018).

Restrictions on the candidates search reduce the possible closure for the job vacancies with unique requirements and those with a limited range. Therefore, the introduction of technological solutions to bypass these restrictions, in our opinion, can be a key advantage of companies operating in the recruitment market. Solutions should provide an opportunity to expand the target audience and channels of its involvement.

The target audience, we believe, are not only applicants in the open status of "looking for a job", but also candidates who have a current job with the intention of considering a proposal to change it. Today, the market has solutions that allow to identify candidates, assess the strength of their intentions and precisely convey to them information about the job (for example, Hr-robot HRom (Table 1).

Technological solutions presented on the market differ in parameters: the volume of investments involved in the development and promotion, the cost of services for users, organization of work and interaction with the customer, implemented functional and the ability to integrate into information systems.

For example, Skillaz platform <http://skillaz.co/> received investment support from market leaders (Sberbank, Gazpromneft, MegaFon) for the development of the required pre-agreed functional. Skillaz also offers its product on the open market at a very "corporate" cost. The product is based on the SAP platform, which allows to fully or partially automating the selection and attraction of applicants. Sources of data on applicants are almost all Russian work sites of the Russian Federation and popular social networks (Vkontakte, Facebook).

The list of functionalities of the system also includes: the purpose of the VR interviews, calling applicants with forces of robotic services, SMS alerts for candidates. Platform developers declare the compatibility of their solution with e-staff and success factors, which is convenient for customers who use these solutions. At the same time, Skillaz offers its customers the purchase of a license for the SOFTWARE, and its support.

Since January 2019, Sberbank has completely switched to Skillaz solutions, which can be regarded, including as the fulfillment of the requirements of the resolution, by which the Russian Government has made changes to the requirements for programs, information about which is included in the register of Russian software.

Table 1. Technological solutions of the personnel search and selection market

Name	Implementation		cost policy and integration opportunities
	search and attraction	diagnostics of applicants	
Skillaz (http://skillaz.co/)	collecting resumes from job sites and social networks	according to the specified criteria using automated surveys and tests. The system allows you to double-evaluate the effectiveness of employees hired with Skillaz-after 6 and 12 months from the start of their work in the company	customers are invited to buy a license for the software, with support. Starting price is from 5 million e-staff and success factors
Potok (https://potok.io/)	collecting resumes from job sites and social networks	diagnosis of applicants is not carried out. The selection funnel is being evaluated	integration with 1C, SAP and Webtutor.

North (https://sever.ai/)	collecting resumes from job sites and social networks	facial expressions and moods of the candidate are recognized during the video interview. The creators claim that the system understands how critical a particular skill for a particular job is.	There are no boxed solutions, the company plans to hire no more than 20 customers per year. The cost is calculated for the project
Friendwork (http://friend.work/)	collecting resumes from job sites and social networks	diagnosis of applicants is not carried out. The selection funnel is being evaluated	the estimated price is determined in the context of one workplace recruiter - from 1725 rubles/month. Integration with 1 S
Robot Vera (https://robotvera.com)	collecting resumes from job sites and social networks	automated surveys and tests are conducted	the estimated price depends on the number of successful responses to the call (minimum package is 62500 rubles for 250 responses)
Handflow (https://huntflow.ru/)	collecting resumes from job sites and social networks	the system has a number of analytical reports on vacancies, recruiters and sources of getting a resume in CRM. Suitability of applicants is not evaluated	the cost is determined by a set of selected services (minimum package is from 34800 rubles per year)
Hr robot HRom (https://hr0m.com)	data collection based on job seeker actions as well as online activity without direct job search	evaluation of applicants takes place before the candidate is offered a vacancy. Only suitable candidates according to customer requirements are collected.	the cost is calculated after free market analysis, depending on market conditions. Integration with AMOcrm, Bitrix 24

Source: compiled by authors

Another popular solution for search and selection automation is <https://potok.io/>. The uniqueness of the solution lies in the ability to view the resume and collect contacts of target groups, add the profile of the candidate links to his pages in social networks (Facebook, LinkedIn, Vkontakte, Telegram), as well as the publication of responses to the vacancy. Such features extend the functional of the solution. The system is integrated with 1C, SAP and Webtutor, which makes Potok acceptable for many domestic companies. Investment support for this decision in July 2017 allowed the company to move out of the startup category.

Technological solution – www.JungleJobs.ru - is positioned as a service for hiring employees, working on the model of the marketplace. This is an analogue of the popular online exchanges, where employers can post jobs, and recruiters and recruitment agencies can take these orders to work. The cost of selection services is also open information, and is charged immediately on the site. For example, the cost of hiring one employee with a salary of 30,000 rubles and a guarantee of two months for the employer is 57,600 rubles. At the same time JungleJobs guarantees unbiased mediation and the role of a mediator in solving complex issues. By its functions, the solution is largely the same as the site headhunter.ru, however, there are differences in the functional and method of charging intermediary services (Table 1).

There are solutions that can assess the relevance of resumes for specific vacancies. For Example, Sever.ai is a platform for automating the search and recruitment of employees. The functional of the solution includes communication with applicants through a robotic call center, and evaluation of video interviews. Such capabilities of the system indicate that the system core is a complex algorithm based on artificial intelligence. At the same time, the functional already involves manual work with settings, and Analytics of the platform itself. However, the system is able to study only open sources to understand the essence of the work of professions. For example, it

can determine how many months cashiers usually work in the Bank – it is enough to analyze publicly available resumes, in the experience of which there is a "cashier in the Bank". Handy feature is, for example, for understanding the relationship between supply and demand on the labor market.

In the market some solutions are implemented that follow the path of automation of a HR specialist's full functional (recruitment, personnel audit, assessment), for example, www.hr-sreda.ru. The platform works according to the classical model: customer service creates a project (in fact the terms of reference) – Sreda aggregates offers and recruiters registered on the platform can offer their services for a specific project. Pricing is also quite transparent. The Commission fee of the platform is 30% of the order. There is a possibility for choosing a contractor (Galazzi and Lang 1998).

One of the most famous projects of the domestic market is <https://robotvera.com>. The project works as an automated system. The customer independently uploads the requirements for vacancies on the project website. These data are checked by the project manager, and they are automatically collected in a common database of all suitable resumes from work sites (HeadHunter, SuperJob, Zarplata.ru, Rabota66.ru and others). Then the system with the use of a robotic calling system reveals the interest of job seekers to job changes, clarifies some of the data for summary. If the candidate agrees, and is ready to continue the dialogue, this candidate is considered to be found and he/she remains in the system for the customer. We also offer the option of video interviews with candidates. The company has changed pricing for customers several times, ranging from free trial periods to the purchase of a package of "positive" candidates. In addition, the rates of "Robot Faith" affect the cost of access to resume sites, which also changes (Yershova and Sergeeva 2017).

Another popular resource with a wide range of opportunities to attract and select candidates for companies is <https://friendahhh!work/>. The solution is positioned as a convenient storage of a single database of candidates collected from different sources with flexible search for it in any parameters. It supports integration with mail and calendars, and saving all actions on the candidate in the event feed. In addition to storing resumes, the system allows you to receive Analytics on the incoming number of resumes, funnels and other parameters that are subject to digitization (Izbasarov 2013). The system is popular among HR agencies, as it allows you to work with a large number of candidates and the customer in the "one window" mode.

The market has a solution to extend the functionality of the above solutions. That is <https://huntflow.ru/>. This solution provides the option to recognize summaries from different formats (pdf, doc. and rtf) and correspondence with candidates. This is useful when resumes of candidates are stored in different formats on different resources. All of these technological solutions from the position of the employer are based on the idea of automating the process of search, attraction and primary selection of applicants. It becomes possible to reduce the labor costs of HR-specialists and the time of the open vacancy, to expand the opportunities of attracting the target audience and to increase the prognostic value of management decisions about the suitability of applicants for the requirements of the vacancy. At the same time, these decisions do not make job search easier for job seekers: they still need to write and post resumes on job sites, maintain pages on social networks, pass face-to-face or video interviews. Therefore, solutions require changing the way you search and interact with your target audience. Such solutions begin to appear on the market (for example, in the form of hr-robot HRom technology).

4. Technology of search and interaction with the target audience

The idea of technology to expand opportunities to find the target audience is to appeal to candidates in different statuses: both those who are in search and those who have jobs in the present. The implementation of the decisions was made by the company HRom Group and in the aggregate was represented with several sequenced steps:

- coordination of the order with the employer: employee requirements, search;
- labor market analysis;

- clarification of order requirements;
- setting of the system parameters to close the job vacancy and formation of a long list of possible places for applicants digital locations;
- candidates screening through contact offers. Organization of the applicants flow to the customer.

Approval of the order with the employer: requirements for the employee and their search. Key parameters of the order require a coordinated presentation and agreement between the participants of the interaction: the employer and the manager of the company HRom Group. It reveals not only a set of requirements, but also the real importance of their availability in the implementation of the functional of employees. Practice records that the initial set of the employer's requirements is overestimated and, often, is formed on the basis of internal (limited) ideas about the possibility of finding candidates in the labor market. The discrepancy in the employer's request, even in a positive finding and closing jobs, is the reason for the early departure of the employee due to the fact that they are not in accordance with the original views/ queries that are advertised in the job, don not get a proper implementation at work (Nikishina 2016). The result of this stage is the order for the search of employees for vacancies with the criteria of suitability of the applicant to the requirements of the position / function and organization.

Labor market analysis. HRom Group estimates capacity and market conditions for all customers based on key order criteria. Search criteria for suitable candidates are entered into the search system. The criteria are projected into the possible office locations of the applicant on the Internet. Information trail left by any person in the network, performing actions on the explicit or implicit job search, in the context of the criteria for the formation of the General population of applicants, allows assessing the market capacity and the ability to meet the request of the employer. Hr-robot HRom system generates information through market monitoring and allows you in retrospect (with different time steps) to name the conditions of the order: how many potential candidates matching the search criteria are available on the market; accumulated experience of closing such orders and interacting with applicants suitable to the requirements of the customer.

The ability to enter a different range of search criteria allows you to "play" and calculate the possibility of closing the job and the cost of the search. This is a significant difference between hr-robot HRom technologies from those available on the market today. As a rule, technology begins to search for applicants based on the actual limitations of the market. Technology hrHRom robot allows you to pre-format before entering the market and the investment of significant resources to work through various scenarios of closing vacancies on the basis of the possibility of "tuning" the range of customer requirements.

The specification of requirements for ordering. The information obtained at the previous stage is the basis for adjustment and approval of the requirements for the order with the employer. Various scenarios of formation for the input flow of applicants enable the employer:

- a) to get an idea about the possibility of the market to close the vacancy on the requirements for applicants in the desired time;
- b) to evaluate the conditions of order fulfillment in the implementation of different parameters (for example, 100 cashiers within a week, meeting 5 key criteria or 150 for the same period, if the number of key criteria is reduced to 4);
- b) to adjust, if necessary, the parameters of the order.

Interaction with the customer in the described sequence of actions causes a greater probability of positive execution of the agreement (because the order is taken by the contractor is not blind, but based on the analysis of the reality of its implementation), and also allows you to more accurately calculate the required resource support.

The configuration of the system by closing job vacancies and the formation of a long list of possible locations of the digital locations of applicants. Generation of candidates is carried out according to the criteria agreed with the employer. Hr-robot HRom technology allows to obtain information about possible locations of potentially suitable candidates (corresponding to the criteria) on the information trail. In fact, the manager receives information with a description of the places of presence in the network and the time frequency of stay on each resource of people with specified criteria (Ozernikova 2018).

A significant difference of this search is the lack of rigid binding to the status of the candidate «in search of work". The technology carries out search in all places where the person leaves an information trace. Advanced search allows a remarkable expansion of the input stream candidates. That is a significant advantage in the implementation of the search in the labor market and the recruitment of specialists.

Candidates screening through contact offers. Organization of the flow of applicants to the customer. The list of digital locations of potentially suitable candidates serves as a basis for configuring the parameters of information distribution to the target audience and choosing ways to establish contact with the applicant. The tool kit includes a variety of tools: targeted contextual advertising, pop-up banners, targeted displays in social networks, etc. The rationale for the choice of means depends on the location of potential candidates and the degree of their preference in using different means of communication and receiving a job offer.

The negative response of the potential candidate serves as a signal for the hr-robot HRom technology and when accumulating significantly large data on the failure rate, a decision is made about the inexpediency of its use in the implementation of the order with the specified search criteria (Tolymbekova, Sultanov and Taylak 2016). A positive response of a potential candidate starts a dialogue between the candidate-operator of the call-center with clarification of the degree of interest in the vacancy and personalization of the contact. A quick (within 2 minutes) contact of the call-center employee is made with the interested applicant and arrangements for a meeting with the employer are indicated. HrHRom robot technology has a recessed configuration by the coordination of the employer's schedule of meetings with the applicant. The end of the work on the generation of the input stream of applicants is to record the fact of his arrival in the company. Technological solution HrOm.com significantly expands the capacity of the labor market for specific needs of the employer (Uakhitzhanova, Shokhan and Omarova 2017).

Testing and launching the presented solution is carried out during the last year. Cases for different typical situations and the employer's requests have been implemented. For example, it is the order of a supermarket chain in the Siberian Federal district to search for line staff (200 employees). The order was implemented in the labor market for 81 days; a coefficient of consolidation of employees is 67%.

The implementation of the cases proposed by the technological solution allows bypassing the previously identified limitations of the services used. The key result for applying Hr-robot HRom technology is work with the expanded market of the offer and interaction with the target audience in the compressed time parameters with high conversion of qualifying stages (Aimagambetov, Stefanov and Kuttybaeva 2016).

Application functionality. Obviously, academic and financial autonomy covers those areas in which Kazakhstan faces the greatest challenges. The rationale for providing greater autonomy to educational institutions is to improve the response of higher education institutions to the needs of the country and society. This should lead to more innovative capacity and efficiency. By continuing its transition from control to management strategy, the state can also stimulate the development of a productivity culture.

The goals of Kazakhstan regarding the education system are clearly reflected in a number of political statements that link education with the broader goal of becoming one of the leading nations in the world. Three of these statements have a direct impact on the provision of high-quality higher education by Kazakhstan:

- Strategy - 2050, which highlights the crucially important role of higher education in the process of training skilled labour;
- The State Program for the Development of Education (GPRO) for 2011-2020 (2010) and the State Program for the Development of Education and Science for 2016-2019. (2016) MES RK, which emphasize (among many other statements) the need to prepare students and undergraduates to meet the needs of industrial-innovative development, the importance of independent assessment of the qualifications of graduates and the importance of integration into the European higher education area;

- Plan of the nation: 100 concrete steps. The main points of this document are the creation of a group of ten leading institutions of higher education, which will receive additional resources and autonomy in order to transfer their experience to other institutions of higher education, gradually eliminate centralized education management and introduce English as a widely used language of instruction.

The decline in the number of universities is mainly due to the closure of private institutions. We will determine how the number of graduates of secondary schools and the number of colleges influence the number of universities in Kazakhstan. To do this, we construct a two-factor regression model. The necessary data has presented in the following Table 2.

Table 2. Data on the number of graduates of secondary schools and the number of colleges in Kazakhstan

Year	Number of universities, units	Graduation of 11 grades from secondary schools, in thousand people	Number of colleges, units
2006	176	199	442
2007	167	182	460
2008	143	152	470
2009	148	143	480
2010	149	151	494
2011	146	173	494
2012	139	169	610
2013	131	149	785
2014	126	133	775
2015	125	129	780
2016	130	127	803
2017	127	138	808

Source: compiled by authors

We introduce the following notation:

y - number of universities (units);

x_1 - graduation of 11 grades from secondary schools, in thousand people

x_2 - number of colleges, units

The desired two-factor regression model will be:

$$y = a + b_1x_1 + b_2x_2$$

We will estimate the parameters of the two-factor regression equation using the Regression analysis tool (Data Analysis in Excel). As a result of data approximation, we obtain the regression analysis protocol, which is presented below.

Regression Statistics	
Multiple R	0,929108039
R-square	0,863241749
Normal R-square	0,832851026
Standard error	6,681235382
Observations	12

Analysis of variance				
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>
Regression	2	2535,916511	1267,958255	28,404779
Remainder	9	401,7501561	44,63890623	
Total	11	2937,666667		

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t-Statistics</i>	<i>P-Value</i>
Y-intersection	116,9132981	29,70710797	3,935532811	0,0034291
x1	0,367180651	0,131124904	2,800235808	0,0207047
x2	-0,050588823	0,018658081	-2,711362622	0,023944

As a result, we obtain the following equation of multiple linear regression:

$$y = 116,913 + 0,367 x_1 - 0,051 x_2$$

The coefficient of multiple correlation is $R = 0,93$, which indicates a close relationship between the resultant trait and two factor signs at the same time.

The coefficient of determination is $R^2 = 0,86$, those 86% of the variation of the dependent variable is due to the regression obtained. Check the statistical significance and reliability of the obtained regression equation and its coefficients. From the data of the protocol for performing the regression analysis, we find that the observed value of the Fisher criterion is $F_{набл.} = 28,40$. Critical Fisher criterion values at significance level $\alpha = 0,05$ and the number of degrees of freedom $k_1 = m = 2$, $k_2 = n - m - 1 = 9$ (where n is the number of observations, m is the number of factors) is equal to $F_{крит.}(0,05; 2; 9) = 4,26$. As $F_{набл.} > F_{крит.}$ ($28,40 > 4,26$), then we can conclude about the statistical significance and reliability of the resulting regression equation.

The statistical significance of the individual coefficients of the equation will be determined using the Student's t-statistics. The observed values of this statistic for individual coefficients are respectively equal to:

$$t_a = 3,93, \quad t_{b_1} = 2,80, \quad |t_{b_2}| = 2,71.$$

The critical value of student's criterion at the level of significance $\alpha = 0,05$ and the number of degrees of freedom $k_1 = n - m - 1 = 9$ равно $t_{крит.}(0,05; 9) = 2,26$. Since the observed values of t-statistics for all coefficients are greater than the critical value of Student's criterion, it can be concluded that the coefficients of the regression equation are statistically significant and reliable.

Analyze the resulting equation of the multiple linear regression:

$$y = 116,913 + 0,367 x_1 - 0,051 x_2$$

– with an increase in the output of pupils of 11 classes from general education schools by 10 thousand people, the number of universities increases by 4 units. Since the number of graduates has decreased in the last

decade, it is better to draw the opposite conclusion: a decrease in graduates of general education schools by 10 thousand people entails a decrease in the number of universities by 4 units;

- the additional opening of 100 colleges leads to the closure of 5 universities.

Determine the average aggregate coefficients of elasticity:

$$E_{yx_1} = b_1 \cdot \frac{\bar{x}_1}{\bar{y}} = 0,367 \cdot \frac{153,75}{142,17} = 0,40\% ,$$

$$E_{yx_2} = b_2 \cdot \frac{\bar{x}_2}{\bar{y}} = -0,051 \cdot \frac{616,75}{142,17} = -0,22\% .$$

After analyzing these elasticities, we obtain the following conclusions:

1) when increasing the number of students in grades 11 from secondary schools (x_1) at 1% of the average level, the number of universities (y) increased by 0.40% of its average level with a constant number of colleges.

Reverse: while reducing graduates of secondary schools (x_1) at 1% of the average level, the number of universities (y) reduced by 0.40% of its average level with a constant number of colleges;

2) with an increase in the number of colleges (x_2) at 1% of the average level, the number of universities (y) decreases by 0.22% of its average level with a constant number of graduates of secondary schools.

Now we will determine which of the two factors considered has the greatest influence on the change in the number of universities, for this we calculate the pairwise correlation coefficients using the Correlation analysis tool (Excel data analysis). The result is:

	y	x_1	x_2
y	1		
x_1	0,86	1	
x_2	0,86261	0,73262	1

Thus, we can conclude that the number of universities is insignificant, but still it is more influenced by a factor - graduation of 11 grades from general education schools, than a factor - the number of colleges.

In the future, the number of universities and educational programs participating in the accreditation process will increase, as a quality culture is gradually being formed in the country, which is the basis of the desire of universities to increase competitiveness. In addition, with the adoption of the Law of the Republic of Kazakhstan "On Amendments and Additions to Certain Legislative Acts on Education Issues No. 398-V of November 13, 2015", additional incentives for the development of accreditation were introduced. Firstly, this is an exemption from the procedure of state certification of programs that have passed institutional and program accreditation. In addition, from January 1, 2017, state-issued education certificates will be issued to students who have successfully mastered the educational programs of universities that have passed international accreditation with foreign or national accreditation bodies entered in the National Register. As a result, private universities also began to be active in the passage of accreditation to obtain the possibility of issuing a state diploma. However, from 2021, all universities, regardless of the form of ownership, will issue students with their own diplomas. Currently, the national quality assurance system for higher education consists of two parts: the procedures carried out by the Committee on the Control of Education and Science of the MES RK and the procedures carried out by independent non-governmental organizations.

According to the analysis of the EUA, which we considered, the level of autonomy of higher education in Kazakhstan is far from ideal and is well below the average level of autonomy of 28 European countries. Kazakhstan is lagging behind the international trend in the replacement of centralized state control and regulation of management forms that emphasize the importance of policies, the establishment of national goals, decentralized institutional management and the use of financial policies. As the process of providing schools with greater autonomy develops, the government and national financial institutions should ensure that there are guarantees.

Since the ability to make cash management decisions is fundamental to any other management area, ensuring financial flexibility combined with accountability for results is an important first step in helping educational institutions become more efficient and innovative in their missions. As Kazakhstan moves forward in building a higher education system that takes into account the knowledge needs of a modern economy and society, it is necessary:

- 1) Strengthen governance at the institutional level to ensure deeper decentralization and greater financial, academic, and organizational flexibility, as well as the freedom to operate in higher education institutions:
 - The government should support the development of the governing council system in the selection of managers within the public sector, ensure control of institutional operations, support and improve the efficiency of institutions and ensure the successful implementation of the mission of each educational institution.
- 2) To increase the transparency of management in public and private institutions of higher education:
 - The government must adhere to an audit approach to ensure financial integrity. Conducting rigorous financial audits based on common standards should be a means of ensuring integrity and transparency;
 - focus on intermediate and final results
 - it is necessary to develop a national system of higher education data for analyzing the results of higher education and providing information to the process of developing national policies and funding strategies.
- 3) Within the academic community itself, develop and implement a reliable accreditation system and a national qualifications framework as the basis for ensuring and improving the quality of education, which will provide a rationale for the need for academic operational autonomy:
 - to formulate a quality assurance process based on certification and inspections, as well as the use of accreditation, which will ensure the further development of high-quality education and research.
- 4) Clearly distinguish between the respective goals of the public and private sectors of the higher education system.

Conclusions

The review of technological solutions that allow to automate the functions of attraction and primary assessment of the applicant's suitability, make it possible to conclude:

- the market is in the stage of active saturation and search for new niches. Various promotion strategies are selected: deepening and / or expanding the functional of automated systems;
- strengthening of competitive positions of the companies that implement technological solutions is conducted including through representation of unique services, i.e. ones which have not been absent earlier in the market (for example, search of suitable applicants who are not in the status job search);
- solutions based on artificial intelligence technologies are becoming in demand, allowing to significantly expand the labor market supply, improve communication channels and interaction with the target audience.

At the same time, automation of the processes aimed at attracting and selecting candidates is accompanied by increased concerns of HR specialists regarding their replacement and reducing the importance of functional to ensure the current activities of the organization.

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Alena BORISOVA is Doctor of Economic Sciences, Professor, Head of the Department of management of Novosibirsk State Technical University, Novosibirsk, Russia. Research interests: management, innovations, personnel management
ORCID ID: orcid.org/0000-0003-1501-2234

Madina RAKHIMBERDINOVA is PhD of the School of Business and Entrepreneurship of D. Serikbayev East Kazakhstan state technical university, Ust-Kamenogorsk, Kazakhstan. Research interests: management aspects of economic development, regional economy, marketing, innovation.
ORCID ID: orcid.org/0000-0001-9009-8686

Elvira MADIYAROVA is Candidate of Economic Sciences, Associate Professor, Dean of the School of Business and Entrepreneurship of D. Serikbayev East Kazakhstan state technical university, Ust-Kamenogorsk, Kazakhstan.
Research interests: financial aspects of economic development, regional economy, investments, financing, innovations.
ORCID ID: orcid.org/0000-0002-2944-6968

Inna RIASANTSEVA is Candidate of Economic Sciences, Associate Professor, Vice-rector for academic Affairs Novosibirsk state University of architecture, design and arts, Novosibirsk, Russia.
Research interests: management, business processes, personnel management
ORCID ID: orcid.org/0000-0003-2502-4722

Natalia MIKIDENKO is Candidate of Sociological Sciences, Associate Professor, Head of the Department Sociology, political science and psychology of Siberian state University of telecommunications and Informatics, Novosibirsk, Russia.
Research interests: education, business process management
ORCID ID: orcid.org/0000-0002-2232-8088

Register for an ORCID ID:
<https://orcid.org/register>

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THE PROBLEM OF SAVINGS EXCLUSION AND GROSS SAVINGS IN THE NEW EUROPEAN UNION MEMBER STATES*

Robert Huterski ¹, Agnieszka Anna Huterska ², Justyna Łapińska ³, Ewa Zdunek-Rosa ⁴

^{1,2,3,4} Nicolaus Copernicus University in Toruń, Poland

The Faculty of Economic Sciences and Management, ul. Gagarina 13a, 87-100 Toruń

E-mails: ¹ robhuski@umk.pl; ² huterska@umk.pl; ³ justlap@umk.pl; ⁴ ezdunek@umk.pl

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Abstract. The problem of the exclusion of some households, in particular those less affluent, from the use of financial services available on the market, including savings, is an important issue in the literature due to the objectively identified negative social and economic consequences of such exclusion. The research objective of the article is to attempt to identify factors related to savings exclusion which determine the share of gross savings in GDP in the new European Union member states. To achieve the goal, a panel data model was estimated. The set of statistically significant factors that adversely affect the creation of gross savings in the economy, and thus the higher level of savings exclusion, include the unemployment rate, social contributions, household debt, the Gini coefficient, and the share of people aged 25-49 in the total population. All these variables are negatively correlated with the explained variable, which means that an increase in their value causes a fall in gross savings. The results of the research have shown that such a highly aggregated measure as gross savings in the economy can be useful for analysing selected aspects of savings exclusion occurring in the examined new member states of the EU.

Keywords: savings exclusion; gross savings; national accounts

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1. Introduction

Creating broadly understood savings by households is an important element in maintaining their ability to function properly in difficult situations (Coffinet & Jadeau, 2017, p. 2; Trębska, 2018) and can be crucial for maintaining acceptable living standards for retirement period (Nguyen et al., 2019). From the macroeconomic perspective, the supply of savings is important for developing national financial systems that support long-term growth of economies (Skare, & Porada-Rochoń, 2019; Vukovic & Prosin, 2018).

The situation in which people earning income do not accumulate savings at all, or their savings are very small, is referred to in the literature as savings exclusion, while actions eliminating barriers to savings are called savings inclusion (Blake, de Jong, 2008, p. 11). Research on the causes of exclusion and the possibility of including savings in a given community is usually focused on the analysis of the characteristics of people, or groups of people, who do not save at all or save very little. These characteristics generally include age, sex, education, occupation, ethnicity, place of residence, or housing conditions (Kempson & Whyley, 1999, p. 7). At the same time, when considering the issue of savings from the macroeconomic point of view, it is worth noting that in the context of the so-called national accounts, gross savings are an important item. They are defined as the difference between disposable income and consumption (adjusted for funds changes in pension funds) on the scale of the total economy (SNA 2008, p. 182).

The research objective of this article is to attempt to identify factors related to savings exclusion, which determine the share of gross savings in GDP. The work focuses on the analysis of the issue in relation to the new European Union member states, admitted to the Community in 2004 and afterwards. Data for the time period 2007-2017 are derived from the Eurostat database.

2. Literature review

2.1. Savings in the economy as a macroeconomic category

Among the macroeconomic data relating to savings, an important category is the balance of savings accounts in banks. However, this is a category covering only one form of saving (IFC, 2016, p. 8). In contrast, the household savings rate is estimated by dividing the difference between disposable income and consumption by disposable income (adjusted for changes in pension funds), but only for this sector (Jalava & Kavonius 2007, p. 10). What disposable income includes is only income obtained from the provision of capital in various forms (interest and rent). Households' payments for the purchase of financial and non-financial assets, which become their property reserves and broadly understood savings, are included as consumption (for instance, of financial services), and in special cases can be treated as gross fixed capital formation (SNA 2008, p. 182). This consumption is partly included in the income of other groups of economic entities, especially financial ones. It should be noted, however, that gross savings data is flow statistics in a given period and not accumulation from previous periods (stocks), which is particularly visible when gross savings are recognized as a percentage of GDP from a given year.

In the context of collecting savings, one should also take into account various forms of direct and indirect investment by households in securities, which give them the right to take over part of the income of financial and non-financial enterprises after the settlement period. Moreover, there is a subgroup of business entities (quasi-corporations), which, however, are a specific form of activity performed by individuals, and the savings they collect are not included in household savings (SNA 2008, p. 61). The wider category of gross savings, which comprises all groups of institutional units in the total economy, enables us to avoid narrowing of the concept of savings typical of household savings. The savings rate defined in this way has the advantage that it also takes into account financial resources of households in various forms, even those that remain outside the formalized system of financial institutions. Importantly, the construction of the disposable income category means that institutional units other than households have a much smaller share in it (SNA 2008, p. 183).

2.2. Savings exclusion and its causes

Savings exclusion is one of the types of financial exclusion. The literature on the subject lacks one commonly accepted definition of savings exclusion. Most often it is defined by its symptoms and types (EC 2008, p. 30). In this paper, savings exclusion is considered to be the lack of exclusion from the consumption of part of the income or its exclusion but at a very low level.

The research on savings exclusion conducted worldwide indicates its various causes. The impact of low incomes is widely emphasized as a key barrier to creating savings (EC 2008, p. 12; Verba & Kudinova, 2019). Blake and de Jong (2008) indicate financial habits that are acquired and practiced in higher-income social groups, which are lacking in the poorer part of society (Łukasiewicz et al., 2018). That is why Bernheim, Garrett and Maki (1997, p. 24) indicate the special effectiveness of financial education among young people who did not learn practical saving patterns from their parents. Dixon (2006, p. 44) indicates as another reason the fact of abandoning the previous generations' 'thrift ethics' by the current generations and adapting 'consumption ethics' instead which is related to the growing scope of financing the needs by means of loans, not savings. Financial Services Authority (2006, p. 5) in its research refers to the motivation gap associated with inertia (people tend not to make decisions if they are not forced to), and especially with the so-called hyperbolic discounting (people prefer instant, though small benefits, rather than deferred rewards). Other reasons for savings exclusion include many personal characteristics - in particular, age, gender, ethnicity, family situation, housing conditions (Kempson & Whyley 1999, p. 4; Coffinet & Jadeau, 2017, p. 3).

The above mentioned reasons for the savings exclusion can be called primary causes, which also affect other types of financial exclusion. However, it should be noted that savings exclusion may also result from the lack of a bank account, which is necessary to take advantage of any form of formal savings (Kempson, Finney 2009, p. 4). Therefore, financial inclusion at the basic level, i.e. having a bank account (Huterska, Huterski & Polasik 2018), constitutes a prerequisite for savings inclusion. The lack of it, in turn, may be caused not only by the previously indicted individual features of the excluded (Polasik, Huterska & Meler 2018), but also by external barriers. These include factors on the supply side, such as, for instance, high costs of financial services (Agarwal, 2016), the lack of availability of infrastructure in the form of bank outlets, ATMs and EFT-POS terminals (Reddy, 2017; Agarwal, 2016), as well as the non-adaptation of products to the users' needs (IFC, 2016, p. 8).

3. Methodology and data

The research objective of the article is to attempt to identify factors related to savings exclusion which determine the share of gross savings in GDP in the new EU member states. The following research questions were formulated in the work, referring to the potential factors presented in the subject literature:

Q1: Does the increase in household income burden related to their indebtedness and social security contributions significantly reduce the share of gross savings in GDP?

Q2: Does the higher income stratification of the society significantly reduce the share of gross savings in GDP?

Q3: Does the high proportion of young people (aged 25-49) in the total population contribute to a significant reduction in the share of gross savings in GDP?

To answer these questions, data from the Eurostat database for the 2007-2017 time period were used, both for the dependent variable and the explanatory variables.

Based on the literature review and the research questions posed, the following theoretical model (formulas 1 and 2) was proposed that points out factors affecting the degree of savings exclusion in the new European Union member states.

The model specification for panel data:

$$GrossSaving_{jt} = \alpha_0 + \alpha_1 GDPgrRate_{jt} + \alpha_2 GDPpc_{jt} + \alpha_3 UnempRate_{jt} + \alpha_4 SocBenef_{jt} + \alpha_5 HhSocContr_{jt} + \alpha_6 IncomQuint_{jt} + \alpha_7 HousDebt_{jt} + \alpha_8 GiniCoef_{jt} + \alpha_9 InternBank_{jt} + \alpha_{10} Aged25_49_{jt} + \alpha_{11} Aged50_65_{jt} + v_{jt}$$

(1)

$$v_{jt} = e_t + u_j + \varepsilon_{jt}$$

(2)

The description of individual variables and the sources of data used are presented in Table 1.

Table 1. The variables used in empirical investigation

Variables	Description of variables
<i>GrossSaving_{jt}</i>	Gross savings – represent the difference between disposable income and consumption plus net current transfers.
<i>GDPgrRate_{jt}</i>	GDP growth rate – gross domestic product (GDP) at market prices - annual data, chain linked volumes, percentage change on previous period
<i>GDPpc_{jt}</i>	GDP per capita in PPS - Index (EU28 = 100). The volume index of GDP per capita in Purchasing Power Standards (PPS) is expressed in relation to the European Union (EU28) average set to equal 100.
<i>UnempRate_{jt}</i>	Unemployment rate, total, %.
<i>SocBenef_{jt}</i>	Social benefits other than social transfers in kind, payable, percentage of gross domestic product (GDP), general government.
<i>HhSocContr_{jt}</i>	Households' actual social contributions, receivable, made by households to social insurance schemes to make provision for social benefits to be paid. percentage of gross domestic product (GDP), general government.
<i>IncomQuint_{jt}</i>	Income quintile share ratio (S80/S20) The ratio of total equivalised disposable income received by the 20 % of the population with the highest income (top quintile) to that received by the 20 % of the population with the lowest income (lowest quintile).
<i>HousDebt_{jt}</i>	Household debt - consolidated including non-profit institutions serving households - % of GDP.
<i>GiniCoef_{jt}</i>	Gini coefficient of equivalised disposable income defined as the relationship of cumulative shares of the population arranged according to the level of equivalised disposable income, to the cumulative share of the equivalised total disposable income received by them.
<i>InternBank_{jt}</i>	Individuals using the internet for internet banking - % of individuals aged 16 to 74.
<i>Aged25-49</i>	Aged 25-49 - Population by age group - % of total population.
<i>Aged50-65</i>	Aged 50-65 - Population by age group - % of total population.
<i>v_{jt}</i>	Random error in the object <i>j</i> , in the time period <i>t</i> , which consists of the following components: <i>e_t</i> – impulses affecting all observations in the period <i>t</i> , <i>u_j</i> – impulses affecting all observations in the object <i>j</i> , <i>ε_{jt}</i> – impulses affecting only observations in the object <i>j</i> , in the period <i>t</i> .

Source: own compilation based on: Eurostat (2019) <http://ec.europa.eu/eurostat/sectoraccounts>

4. Results

Estimation of the panel data model, defined by the formula (3), was made using the Gretl programme (version 9.1.14.). Both the occurrence and significance of individual effects, as well as the nature of individual effects themselves (fixed or random) were not assumed a priori.

The choice of the estimation method (pooled OLS, fixed effects, random effects) was made using the decision procedure proposed in the econometrics literature (see, among others: Baltagi 2001). Models with fixed and random effects were assessed and diagnostic tests were carried out. The results of the diagnostic tests are presented in Table 2.

Table 2. The results of the estimation of the model describing determinants of gross savings related to financial exclusion

Diagnostic test	Test statistic	p-value
<i>Wald test</i>	F=5.92426	<0.00001
<i>Breusch-Pagan test</i>	LM=14.1182	0.000172
<i>Hausman test</i>	H=17.758	0.003265

Source: the author's own calculations.

Based on the diagnostic tests conducted, it was found, with the risk of error at the level of 0.05 ($\alpha = 0.05$), that a suitable model to analyze the impact of the determinants of the saving exclusion is the fixed effects model (FE). Therefore, the parameters of the fixed effects model were estimated.

However, the phenomenon of heteroscedasticity occurred. Heteroscedasticity affects inappropriate estimations of standard errors for individual parameters and the revaluation of the determination coefficient, which may distort the conclusions regarding the significance of variables.

Therefore, to estimate the parameters ultimately, the weighted least-squares method was applied (WLS).

Values of statistically significant parameters of the model described by the formula (3) are presented in Table 3.

Table 3. The results of the estimation of the model describing determinants of gross savings related to financial exclusion

Independent variables	Dependent variable <i>GrossSaving_{jt}</i>									
	The model before <i>a posteriori</i> elimination					The model after <i>a posteriori</i> elimination				
	Coefficient	Standard error	<i>t</i> -ratio	<i>p</i> -value	Significance ^a	Coefficient	Standard error	<i>t</i> -ratio	<i>p</i> -value	Significance ^a
const	62.4292	17.0789	3.655	0.0004	***	81.8230	8.45486	9.678	<0.00001	***
<i>GDPgrRate_{jt}</i>	0.048695	0.104852	0.4644	0.6435		–	–	–	–	–
<i>GDPpc_{jt}</i>	–0.019857	0.0463896	–0.4280	0.6696		–	–	–	–	–
<i>UnempRate_{jt}</i>	–0.220248	0.0818750	–2.690	0.0085	***	–0.273513	0.062594	–4.374	<0.00001	***
<i>SocBenef_{jt}</i>	–0.264728	0.322196	–0.8216	0.4134		–	–	–	–	–
<i>HhSocContr_{jt}</i>	–0.690437	0.264033	–2.615	0.0104	**	–0.887331	0.132667	–6.688	<0.00001	***
<i>IncomQuint_{jt}</i>	0.113715	0.535069	0.2125	0.8322		–	–	–	–	–
<i>HousDebt_{jt}</i>	–0.081552	0.020967	–3.890	0.0002	***	–0.107790	0.0091650	–11.760	<0.00001	***
<i>GiniCoef_{jt}</i>	–0.588484	0.166813	–3.528	0.0007	***	–0.567855	0.0752666	–7.545	<0.00001	***
<i>InternBank_{jt}</i>	0.0389070	0.0222692	1.747	0.0840	*	–	–	–	–	–
<i>Aged25_49_{jt}</i>	–0.619371	0.243111	–2.548	0.0125	**	–0.898029	0.193994	–4.629	<0.00001	***
<i>Aged50_65_{jt}</i>	0.511262	0.440333	1.161	0.2486		–	–	–	–	–
Observations	104					Observations	104			
Standard error of residuals	1.001949					Standard error of residuals	1.000356			
R ²	0.772951					R ²	0.758544			
Adjusted R ²	0.745803					Adjusted R ²	0.746225			
F (11, 92) = 28.47258	<i>p</i> -value for test F< 0.00001					F (5, 98) = 61.57425	<i>p</i> -value for test F< 0.00001			

* Statistically significant variable at the level of 10%

** Statistically significant variable at the level of 5%

*** Statistically significant variable at the level of 1%

Source: the author's own calculations

The above model is correct in statistical terms. Five of the eleven potential explanatory variables turned out to be significant. The general performance of the model is satisfactory ($R^2 = 0.772951$).

As follows from the research carried out, the set of statistically significant factors that adversely affect the creation of gross savings in the economy, and thus the higher level of savings exclusion, include the unemployment rate (*UnempRate_{jt}*), social contributions (*HhSocContr_{jt}*), household debt (*HousDebt_{jt}*), the Gini coefficient (*GiniCoef_{jt}*), and the share of people aged 25-49 in the total population (*Aged25_49_{jt}*). All these variables are negatively correlated with the explained variable (*GrossSaving_{jt}*), which means that an increase in their value causes a fall in gross savings.

5. Discussion

The problem discussed in the article combines the issue of savings as a position in national accounts with the financial and non-financial variables that are related to the problem of savings exclusion. While the literature on savings from the point of view of national accounts is extensive, the issues of savings exclusion have not yet been presented in such an extensive and multi-faceted research description. Even more so, at the time when this article is being finalized, publications describing similar studies on the link between the phenomena affecting savings exclusion and the issues of measuring savings in macroeconomic terms have not come out yet. A proposal for

interpretation of mechanisms combining the results of the above calculations with the specificity of the phenomena associated with savings exclusion (already presented in the subject literature), which in this model play the role of explanatory variables, will be outlined as part of the discussion.

A higher unemployment rate in the economy ($UnempRate_{jt}$) means that more people obtain lower income, and therefore have less opportunities to save. At the same time, the unemployed and their families receive various social benefits, which are becoming more expensive to finance ($HhSocContr_{jt}$). This, in turn, reduces the disposable income of people financing increased payments to cover increased social benefits and simultaneously diminishes the ability to save also of the part of society that is not directly affected by unemployment. At the same time, the redistribution of income to social benefits may reduce the need to save of a certain group of people, inducing them to expect that in a difficult situation the state will support them by supplementing their income.

Growing household debt ($HousDebt_{jt}$) means increased financing of expenditure by loans rather than savings, which confirms the abovementioned abandoning of 'thrift ethics' that was followed by the previous generations and adapting 'consumption ethics' by the current generations. Loans accelerate access to goods and services, however, their repayment with interest ties funds that could be saved.

The higher Gini index ($GiniCoef_{jt}$), which is also referred to as the indicator of social inequality, shows greater income stratification of the society. Importantly, in the group of the thirteen new EU member states covered by the research, all achieve per capita income according to the purchasing power parity (PPS) below the EU-wide average (28 countries). Among the remaining fifteen EU countries (not included in the research) as many as eleven reached income above the average. According to the Gini index and with low per capita income in the country, the greater income stratification, the greater part of society is excluded from the possibility of saving due to the fact that their income hardly covers basic needs.

In turn, the higher the share of young people (i.e., aged 25-49) in the population ($Aged25_49_{jt}$), the lower the gross savings - this seems to be a somewhat surprising result. However, it should be remembered that the research concerns a less affluent group of EU countries with high consumption needs in society, which was reflected in the household debt variable ($HousDebt_{jt}$). In the 25-49 age group, a significant part of it is made up of people with a short-term employment period, who do not yet have sufficiently large incomes to save larger amounts. The other part is people who are professionally stable, but who set up families and have higher expenses for children, repayment of a mortgage, etc.. Thus their higher incomes do not allow saving a lot, either.

Some explanatory variables included in the model were statistically insignificant. This can be explained by referring to the features of specific countries within the studied group. Only Malta and Cyprus had been market economies for many decades before they joined the EU. The remaining eleven countries had been functioning under the centrally planned economy system for several dozen years, which limited their wealth, while reducing the consumer's consumption possibilities. After switching to a market economy, the extreme propensity to consume grew faster than income. Therefore, the GDP growth rate variable ($GDPgrRate_{jt}$), GDP per capita ($GDPpc_{jt}$) and social benefits ($SocBenef_{jt}$) could turn out to be statistically insignificant in relation to gross savings. On the other hand, the income quintile coefficient ($IncomQuint_{jt}$) indicates only a multiple of income of 20% of the richest part of society in relation to 20% of the poorest, ignoring the situation of the remaining 60% of the society.

The use of the Internet for banking transactions (*the InternBank_{jt}* variable) by persons aged 16-74 is primarily a measure of the popularity of one of the distribution channels of banking services, which does not have to be directly related to the propensity to save. The share in the population aged 50-64 ($Aged50_64_{jt}$) also turned out to be a statistically insignificant variable. This may be due to the interaction of mutually cancelling factors. This is the age at which high income from work is achieved, but this group also includes people of retirement age,

especially women and people who are unable to work and receive bridging pension or sickness allowance. Moreover, it should be noted that this group is also less numerous when compared with the 25-49 age category (*Aged25_49_{it}*), which turned out to be statistically significant in the model.

These comments were based on the above-cited literature as well as on other publications regarding various factors of financial exclusion and savings, especially in the macroeconomic context. A group of inspirational materials included works by Gloukoviezzoff (2011), Dabla-Norris et al. (2019), Martinez Turegano & Herrero (2018), Gustman & Steinmeier (2015) and Brecher, Chen & Choudhri (2010). Also useful were some publications related to the specifics of financial exclusion in the USA (Karp & Nash-Stacey, 2015), Australia (Wilson, 2012), and East Asian countries (Han et al. 2019; Park & Mercado, 2015; Horioka, 2010). Regardless of the local specificity, these sources also present convergent mechanisms for developed economies and societies representing different continents.

A literature review carried out on this occasion revealed that there are very few publications on savings exclusion in the European Union countries shown in a broader economic context.

Conclusions

The problem of the exclusion of some households, in particular those less affluent, from the use of financial services available on the market, including savings, is an important issue in the literature due to the objectively identified negative social and economic consequences of such exclusion (EC 2008, p. 12). Households lacking adequate savings, even those collected outside financial institutions, are at the same time deprived of the possibility of protection against the negative effects of events such as loss of work, sickness, unexpected expenses (even a failure of household appliances), thefts, fires, or any other events resulting in a negative outcome. This is important because savings exclusion often goes hand in hand with insurance exclusion (Blake & de Jong, 2008, p. 98).

The research objective of this work was to identify factors related to savings exclusion, which determine the share of gross savings in GDP in the new EU member states. The research shows that the burden imposed on households' incomes related to their indebtedness as well as social contributions, reduces the share of gross savings in GDP (which provides a positive answer to the research question Q1). It was also shown that the greater income stratification of the society, the smaller the share of gross savings in GDP (positive answer to the research question Q2). The analyses made also show that the high share of people aged 25-49 in the total population decreases the share of gross savings in GDP (positive answer to the research question Q3). At the same time, the results of the research have shown that such a highly aggregated measure as gross savings in the economy can be useful for analysing selected aspects of savings exclusion occurring in the examined new member states of the European Union.

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Robert HUTERSKI holds a Ph.D in economics, he is an assistant professor at the Department of Digital Economy and Finance, the Faculty of Economics and Management at the Nicolaus Copernicus University in Toruń, Poland. His scientific interests cover public finance, monetary policy, finance of the European Union, R&D and IT in finance. He participated in Phare ACE-P95-2038-R programme “Central Banking in Transition Economies” in 1995-1997 and Tempus, JEP-11350-96 programme “International Finance” in 1997-1998. He was awarded one-year Polish-British Intergovernmental Scholarship at the University of London, Birkbeck College in 1994, five-months Junior Fellowship of Dekaban-Liddle Foundation in 1997 and one-month Senior Fellowship of Dekaban-Liddle Foundation in 2006 at the University of Glasgow. He is the author of nearly sixty scientific publications.

ORCID ID: 0000-0001-9821-7176

Agnieszka HUTERSKA holds a Ph.D in economics, she is an assistant professor at the Department of Digital Economy and Finance, the Faculty of Economics and Management at the Nicolaus Copernicus University in Toruń, Poland. She has over 50 publications in the field of economic sciences in her scientific achievements. Her research interests focus on financial exclusion, ITC inclusion, corporate finance, financial market. Since 2018 she has lead research project "Local conditions for the acceptance and use of non-cash payments in Poland" carried out in cooperation with the Foundation Warsaw Institute of Banking.

ORCID ID: 0000-0002-4722-2853

Justyna LAPIŃSKA is an Associate Professor in the Department of Organizational Behavior and Marketing, the Faculty of Economic Sciences and Management, Nicolaus Copernicus University in Toruń, Poland. Her research interests focus on international trade, economic integration, international marketing and organizational behavior.

She is an author of over 80 papers published in scientific journals (including twelve from the JCR list) and two monographs.

ORCID ID: 0000-0003-4134-4750

Ewa ZDUNEK-ROSA holds a Ph.D in economics, she is an assistant professor at the Department of Econometrics and Statistics at the Faculty of Economic Sciences and Management of the Nicolaus Copernicus University in Toruń, Poland. Her research interests focus on: econometrics, statistics, especially business bankruptcy forecasting, business finance, modeling of quality variables.

ORCID ID: 0000-0002-6858-7309

Register for an ORCID ID:

<https://orcid.org/register>

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POLISH ROAD FREIGHT TRANSPORT AND PROCESS OF INTERNATIONALISATION – SELECTED EFFECTS FOR QUALITY AND COMPETITIVENESS

Małgorzata Kędzior-Laskowska

University of Warmia and Mazury in Olsztyn, ul. Oczapowskiego 2, 10-719 Olsztyn, Poland

E-mails: malgorzata.kedzior@uwm.edu.pl

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Abstract. This article analyses conditions of functioning of Polish road transport carriers according to the internationalisation process and its potential effect on the quality of services and competitiveness. Conditions underlying the Polish road transport sector and its position in the EU transport market are discussed along with the factors that determine the quality of services and competitiveness of the carriers. The relationships between quality and competitiveness are also identified to establish the strength and direction of their impact. Considering the specificity of the Polish market of road freight transport (vast supply fragmentation) and growing competitiveness in international markets the objective of this paper is to answer the questions: whether internationalisation processes influence the quality of transport services, and to what extent; if internationalisation processes play a role in the improvement of transport services (competitiveness), and if there is a dependence between the quality of services and competitiveness of road carriers, including the aspect of internationalisation? The data was interpreted using descriptive statistics, an analysis of variance (ANOVA), as well as the determined correlation and determination coefficients. This study identified the significant role of internationalisation on the service quality and competitiveness of carriers. It also confirmed a positive correlation between them. Equally important was the fact that qualified and well-educated staff was the most important factor in improving quality and competitiveness.

Keywords: road freight transport; service quality; competitiveness; transport market; internationalisation; Poland

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1. Introduction

Transport market development is determined by the functioning of an economy and by the civic, technical and technological processes which accompany its development. Liberalisation and integration are the driving forces of globalisation (Nijkamp, 2003). They have a direct impact on the functioning of transport markets. The new spatial order, access to geographically remote markets, growing social needs and changes in the consumption structure all serve to trigger quantitative and qualitative changes in economic systems, including transportation.

The European freight transport market is particularly dependent on road transport. Road motor vehicles are a significant component of inland transport, which is also performed by rail and inland navigation waterways transport. In 2016, the road transport was responsible for 75% of the freight labour-transport performance in tonne kilometres in the EU Member States. The structure of inland transport indicates that the majority of the freight was transported by carriers from 10 countries (87%). It is worth noting that Polish sector was ranked fifth in EU road transport performance (in tonne-kilometres).

The international nature of transport determines the competitiveness processes. Integration and globalisation processes afford different conditions for service provision. Access to the European market is almost unlimited, stimulating the internationalisation of the transport sector. Cabotage transport is an exception, as it aims to protect resident carriers and to maintain market equilibrium in domestic markets. In most of the EU states, the choice of the road transport for freight deliveries is driven by price and quality considerations. The flexibility, availability and speed of the service as well as its adjustability to specific characteristics of transported commodities are the determinants of inter-branch freight transport competitiveness – in which road transport has a clear advantage. Today, this sector tends to consolidate with companies from other branches (inter-modal transport) and to integrate with subjects operating in the TSL logistics sector and with manufacturers of goods. This cooperation results in long-term contracts for providing services to the food, clothing and car industries, among others. These contracts affect the qualitative development of road carriers as well as their image and position in the market. Thus, they determine the conditions underlying the system and the road freight transport market.

Providing transport services in foreign markets is a strategy of qualitative development, enabling a company to identify its strengths and weaknesses and enhance the reinforcement of intellectual resources, which are currently the main assets for effective building international competitiveness both at micro and macro level (Cieślak, Michałek, 2017, 2018; Mačerinskienė & Survilaitė, 2019; Zygmunt, 2019). Polish road carriers are rarely the main transport manager in western European markets. Subcontracting services allows them to observe their competitors' practices and provides a source of information on the conditions of services and the functioning of carriers in other countries. The ability to make use of such information allows these companies to gain a competitive advantage in the domestic market.

The successful expansion of the Polish carriers in the EU market after 2004 became possible once they adopted the cooperation conditions, service provision and service attributes. The process of liberalisation has, however, been not uniform, which was particularly evident in access to cabotage markets in the EU Member States. The longest transitional period was for the German market (the 3+2 years system was the longest possible time period). At the same time, it was the most attractive market because of its importance in foreign trade and its geographical location. In 2017, the Polish carriers performed 40% of total German cabotage. The German market was also significant from the perspective of the structure of the cabotage transport performed by the Polish carriers (73% of total Polish cabotage).

This article attempts to establish the importance of the internationalisation process in the performance of Polish road freight companies. Special attention has been paid to the role of this process in determining the quality of service and the competitiveness of carriers. The relationships between these two aspects have also been analysed. A questionnaire-based survey was the main research instrument. The respondents evaluated six factors which were significant for the quality and competitiveness of their services:

- processes of competitiveness in the domestic market,
- processes of competitiveness in international markets,
- activities of international companies,
- benchmarking,
- access to cabotage transport,
- qualified and well-educated staff.

The scores assigned by the respondents were subjected to statistical analysis using descriptive statistics, an ANOVA analysis of variance, as well as correlation and determination coefficients.

The first part of the article presents definitions of quality and competitiveness while taking into account the internationalisation in transport market. The methodological part discusses the collected material and describes the research methods. The next part of the manuscript presents study results concerning the factors determining the quality of services and competitiveness of operators including the relationships between them. The article ends with a synthetic overview of the study and a discussion of the results and indicates the possibilities of further research.

2. Literature review

Internationalisation is a process defined as the employment of resources in foreign activities involving integration, knowledge (its successive development and awareness of how foreign markets operate), intangible assets and legal aspects (Hertz, 1993). It affords opportunities for companies to expand and to penetrate new, attractive markets (Cieřlik et al., 2019). The internationalisation of a company's operations is often feasible only after earlier liberalisation (e.g. due to integration), but it requires adaptation of activities to legal requirements which may also affect competitiveness (Poliak et al., 2019). Liberalisation may also act as a barrier to further expansion. The causes of failure have been identified by Kubíčková and Toulová (2013). One of the barriers to the internationalisation of companies operating in foreign markets is the necessity to improve quality while maintaining unchanged prices. It may, thus, be concluded that entrepreneurs are aware of the necessity of taking due care of quality development, which would, consequently, determine their competitiveness. The cited study was conducted using a sample of Czech companies classified as small and medium enterprises. It seems that the study's findings largely correlate with the situation of Polish companies in the same sector, being usually poor in capital, having difficult access to external resources and afraid of failure in the foreign markets. In a study of Trinkūnienė and Aksomitienė (2017), the 'intense competition abroad' was diagnosed as the most serious barrier to internationalisation (in the case of transport and logistics operators from the Scandinavian countries and Central Europe who operated in the Baltic states, i.e. Estonia, Latvia and Lithuania).

The intensification of freight transport arises from the international trade of goods. The potential gains from integration and internationalisation depend on a number of factors. The major are geography, transport costs and exertion of market power (Roberts et al., 2017). The demand for transport grows as the economic expansion proceeds. This demand is triggered by economic growth, but it is also the consequence of such growth (Button, 1993). Business internationalisation and globalisation also modify sources of the need for transport services. The increasing distances and freight flows in response to the personalised needs of manufacturers, coupled with growing sensitivity to the time and speed of delivery and the development of IT and communication networks are the determinants of the development of modern transport systems (Janelle, Beuthe, 1997). Furthermore, demand for transport services is also created by internationalisation process of SMEs, which is considered as one of the important element of the development of international trade (Bužavaitė et al. 2019). The growth of commodity and distribution system markets also affects the above-mentioned sources of needs and generates a demand for high quality transport and logistics services (Rudel, 2005). International freight transport, therefore, depends on international exchange and internationalisation of the manufacturing industry (Hertz, 1993). Our understanding of dependences between the growth of economies and a change in the structure of transport needs determines directions of effective action strategies. Observation of the global market is, thus, essential for the improvement of the quality of services provided by road hauliers, but also for facilitating competition processes in the acquisition of new contracts.

Entering new transport markets (active internationalisation) stimulates the need to modify management strategies, and the need for verification of their effectiveness (Pisar, Bilkova, 2019), undertake research into service quality and adjusting management styles to the expectations of foreign customers (Surugiu, Surugiu, 2015). It also seems

essential to explore the market and to make an in-depth risk analysis and observations of the marketing and economic effects of activities conducted by companies (Kovacs, 2017; Hudáková, Dvorský, 2018). Collaboration between economic entities in the form of joint ventures, or setting up branch companies abroad are two strategies implemented by large companies with large capital resources and providing high quality services that satisfy the expectations of the global market (Koźlak, 2008; Liu, Wang, 2019). Passive internationalisation affects the development of instruments employed to compete in the domestic market. Resident carriers and foreign entities compete to serve foreign trade and domestic production. Under conditions of long-term contracts, the competitiveness of carriers depends on pro-quality actions, including their ability to acquire and make use of knowledge concerning the needs, preferences and transport demands expressed by potential clients (Rucińska, 2012). Falk et al. (2018) have pointed to their variation, depending on the geographical and cultural factors.

Evolution of transportation needs forces carriers to modify their strategy by including competitiveness instruments. This new approach rests on the three main pillars (Mallard, Glaister, 2008):

- advertising and promotional campaigns (creating an image of a carrier),
- development of services (outcomes of investing into R&D to create unique services, optimally those with added value),
- patent protection (if needed).

The choice of a carrier can be based on such criteria as the price and quality of service, or on other non-price considerations (cf. Solakivi, Ojala, 2016). In the prospect of long-term cooperation, the non-price attributes of carrier services should prevail. Therefore, the continuous monitoring of the market plays a significant role due to the impact of internationalisation on the growing demand for high quality services expected from carriers (Koźlak, 2008).

The quality of transport services can be viewed from a marketing perspective (cf. Thai, 2013) or the economics of transport and ‘the value of travel time savings’ (cf. Zamparini et al., 2011). Model classifications of the factors affecting the quality of transport services are provided in Table 1. Considerations dealing with the question of quality frequently refer to its definitions formed in line with ISO standards. Quality should satisfy the requirements of customers and, optimally, surpass their expectations. This rhetoric inscribes itself into the market approach to quality.

Table 1. Classification of quality attributes in transport services

Author	Attributes of quality in transport services
Rudel (2005)	Price, time, punctuality, avoidance of damage
Coyle et al. (2005)	Transit time, reliability, accessibility, capability and security
Meidute-Kavaliauskiene et al. (2017)	Price of transportation, safety, reliability, accessibility of services and duration of delivery
Gea et al. (in press)	‘Internal aspects’ related to the transport fleet properties, infrastructure, loading and unloading, organization and management ‘External aspects’ related to road congestion and environmental aspects

Source: Rudel (2005), Coyle et al. (2005), Meidute-Kavaliauskiene et al. (2017), Gea et al. (in press).

The basic attributes of quality in road freight transport include the general punctuality and safety of deliveries. These are determined by micro- and macroeconomic factors. They may be also described by transport process stages: analysis of requirements, transport planning, departure handling, transport, arrival handling and final activities (Drljača, Sesae, 2019). Road transport, to a large extent, relies on independent variables, e.g. atmospheric conditions (sudden changes in the weather), road conditions (congested traffic, road accidents), social issues (strikes of some labour groups, road blockades), as well as economic and political issues (periodically occurring difficulties in access to the Eastern markets). The involvement of entrepreneurs in designing a complex

and high quality offer, creating added value, ensuring high quality fleet, or building qualified and experienced labour resources at every step of their business are examples of their direct influence on the quality of services. However, quality development requires capital investment. Understanding cost structure, including operating costs, may also increase competitiveness based on internationalisation (Sternad, 2019).

The literature describes the relationships between quality and competition. A positive correlation between these two aspects is also confirmed in the field of freight transport (see Žvirblis, 2003). The competitiveness of carriers and the quality of the services are determined by the current transport policy, which basically aims at decarbonisation of transport and at supporting sustainable development of transport. Trends in the development of EU transport systems are enforced by the progressive degradation of the natural environment. The existing problem of pricing network infrastructure not only in UE (see Robson, 2018), forces the need of implementing standardized charging system (COM/2017/0275 final – 2017/0114 (COD)). This is one of the instruments of new European Mobility Packet which includes operational and administrative aspects of commercial road freight transport. The proposed changes will affect transport market and conditions of competition. On the one hand, it is considered as adverse for road carriers mainly from Middle and Eastern Europe. In contrast, it is considered a necessity to harmonize international competition mainly by EU-15 countries. The new rules for the road haulage sector will also affect transport in Norway and Iceland (Lindahl, 2019). They are widely discussed, also by International Road Union (IRU). In position paper, IRU argues some improvements but also supports improving instruments proposed by European Commission and developing new ones (IRU I-0364-1, 2017).

3. Research design and methodology

Preliminary interviews among top management of road freight transport companies enabled to identify the factors which could directly or indirectly affect the quality of services they provide and their competitiveness. In the context of internationalisation, these factors were as follows:

- competitive processes in the domestic market,
- competitive processes in international markets,
- the activity of international companies,
- benchmarking,
- cabotage markets,
- qualified and well-educated staff.

The respondents were asked what influence on service quality have the above factors. The second section was about the influence of these factors on competitiveness. They were given closed questions with one choice. Each factor was assessed in context of its influence on quality and competitiveness. The six-point Likert scale were used (where 1 – no influence at all, 6 – great influence of the factor). An average score of around ≥ 4 suggested that a given factor was significant, which led to the identification of quality and competitiveness attributes.

The basic research method consisted of a survey based on a structured questionnaire. The statistical analysis employed measures of location, variation, one-way analysis of variance (ANOVA), correlation coefficient (Pearson's r coefficient) and determination coefficient.

The survey was conducted in 2013 on a sample of 134 carriers from the province of Warmia and Mazury in Poland, including owners and managers of transport companies. In many cases, managers were also owners. It was common practice that the owners/managers were also the drivers, especially in small companies. Around 70% of the respondents represented micro-enterprises employing no more than 9 persons. Although most of them had a fleet of no more than 5 vehicles, they had to be considered as having market experience (nearly half had started their business before the year 2000). The research sample mirrored the subject structure of Polish carriers, with analogical employment structure. Companies occasionally providing transport services were excluded. Slightly less than 30% of the respondents operated exclusively in the freight transport sector. The majority also

confirmed their involvement in other, non-transport activities: cargo dispatch (92 answers), cargo loading (28) and small-scale warehouse operations (8). It can be presumed that offering additional services is a response to market requirements and indicates their comprehensiveness.

The year of study was considered beneficial for the transport sector. The effects of the global economic crisis were no longer felt in the country (although statistical data in Poland did implicate an economic slowdown). This state was indicated by an increasing demand for freight transport and the expected improvement of the economic situation. This growing optimism was observed to coincide with some unfavourable changes in the conditions underlying operations of the Polish carriers in international markets, including: an embargo imposed on Polish food products by the Russian Federation, problems connected with TIR carnets, as well as changes in the conditions of transport service provision in Germany, France and Netherlands.

The mobility package is one of the factors that will considerably change operating rules in European road freight market. Carriers from Poland, among others from Central and Eastern Europe countries, may have problems with free competing. The shift in formal and legal conditions for the provision of services (resulting e.g. in an increase of operating costs) may contribute to decrease in their competitiveness, operating costs may exceed the current margins. The Brexit will also have consequences on EU and transport markets functioning (see Fouskas, Gökyay 2019; Deschaux-Dutard, 2019). The common transport policy is a consequence of the integration of individual EU member state economies, which enforces and accelerates the processes of business internationalisation. Nowadays, changes taking place in European transport markets determine the research area.

New international rules and changes will influence the free movement of goods, services and access to transport markets. These circumstances provide justification for conducting research into internationalisation of transport services in the nearest future. Research results presented in this paper may be a reference point for future research. The dynamics of changes and new terms for provision of transport services may change factors and their importance in shaping quality and competitiveness. This research will have an important comparative value for further exploration of importance of internationalisation in shaping the quality and competitiveness of road carriers.

4. Research results

According to the respondents, human capital turned out to be the factor having the greatest impact on service quality and competitiveness (cf. Figure 1). The education, qualifications and experience of the staff were essential for the design of a high quality offer and gaining a competitive advantage. Other attributes of quality and competitiveness included competition processes in the domestic market ($\bar{x}=4.51$ and $\bar{x}=4.24$, respectively) and the activity of international companies ($\bar{x}=4.04$ and $\bar{x}=4.40$, respectively). Furthermore, the competition processes in international markets were assessed as having no influence on the competitiveness of enterprises ($\bar{x}=3.61$), but were an attribute of their service quality ($\bar{x}=4.57$). In contrast, the access to cabotage markets affected competitiveness development ($\bar{x}=4.72$), but was not an attribute of service quality ($\bar{x}=3.88$). Unexpectedly, benchmarking had no impact on either quality ($\bar{x}=3.19$) or competitiveness ($\bar{x}=3.55$).

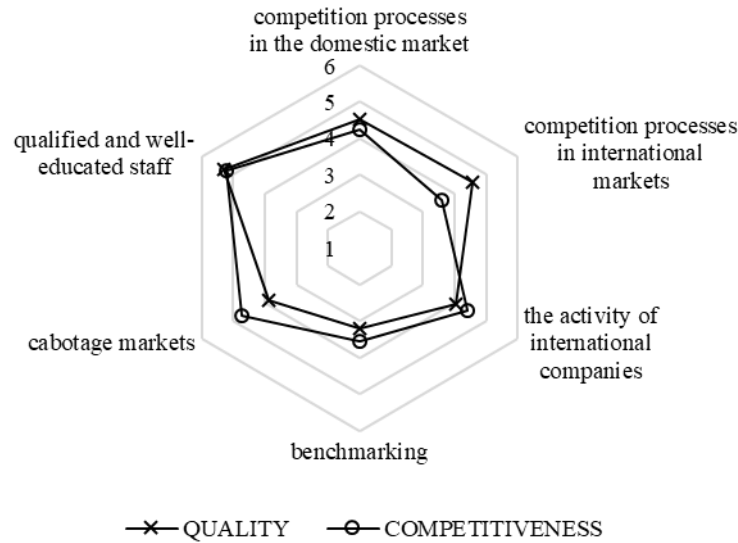


Fig.1. Mean scores given to the factors determining the quality of services and competitiveness of the carriers

Source: the author, based on results in table 3.

The mean scores given by the respondents to the factors affecting the quality and competitiveness were studied with the one-way analysis of variance (ANOVA), which allowed distinguishing homogeneous groups (a given factor had the same effect on quality and competitiveness) and non-homogeneous groups of means (a given factor had a different effect on quality and competitiveness) (see Mikołajczak, 2019; Jakubowska & Radzyńska, 2019). The following hypotheses were proposed:

- (H0), zero hypothesis assuming no effect of a factor on mean scores given to service quality and competitiveness of road transport carriers,
- (H1), alternative hypothesis assuming the effect of a factor on mean scores given to service quality and competitiveness of road transport carriers

at the assumed level of significance: $\alpha = 0.05$. Groups of homogeneous means (which did not differ statistically significantly) were determined based on a positive verification of the zero hypothesis. When this hypothesis was discarded, the alternative hypothesis was accepted, which identified the effect of a given factor on mean scores (indicating a statistically significant difference in mean scores). Respective results are presented in Table 2.

Table 2. Results of the one-way analysis of variance of mean scores given by respondents to factors determining quality and competitiveness

Factors	SS Effect	df Effect	MS Effect	SS Error	df Error	MS error	F Test	p* value
Processes of competition in the domestic market	4.8358	1	4.8358	289.8507	266	1.089664	4.43790	0.036086
Processes of competition in the international markets	61.1343	1	61.1343	356.7164	266	1.341039	45.58728	0.000000
Activity of international companies	8.5970	1	8.5970	277.9701	266	1.045001	8.22680	0.004458
Benchmarking	8.5970	1	8.5970	210.0896	266	0.789810	10.88491	0.001102
Cabotage markets	46.8060	1	46.8060	349.3134	266	1.313208	35.64245	0.000000
Qualified and educated staff	0.5373	1	0.5373	228.1194	266	0.857592	0.62654	0.429333

Source: the author, based on own research results

The homogeneous mean scores were indicated by the highest classified quality and competitiveness attribute, i.e. qualified and well-educated staff. For the remaining factors, statistically significant differences were observed in the scores given by the respondents. This pertains both to the factors which were evaluated as attributes of quality and competitiveness (competition in the domestic market – its role in the shaping quality was scored significantly higher; activity of international companies – a significantly stronger effect on competitiveness), and to the factors which had contrary effects on quality and competitiveness (competition in international markets – attribute of quality and having no effect on competitiveness; access to cabotage markets – significantly greater importance for competitiveness and no influence on quality).

Descriptive statistics showed non-homogeneity of the research sample (cf. Table 3). The greatest differences in mean scores given to quality attributes appeared in the case of cabotage transport (V=32%, R=5). Simultaneously, most of the respondents (31%) considered cabotage transport as significant for the development of the quality of services (D=5). In turn, competition in international markets (V=33%, R=5) turned out to be the factor that caused the greatest variation in the scores given to competitiveness attributes. The highest degree of agreement among the respondents was achieved in their evaluation of educated and qualified staff (V=13%, R=3), as 46% of the respondents gave the highest scores to this factor. In addition, this attribute caused the lowest variation in the assessment of the impact of the analysed factors on competitiveness (V=21%, R=3); it received the highest possible score from over half of the respondents (57%).

Table 3. Descriptive statistics of factors determining quality (Q) and competitiveness (C)

Variables		Number	Average	Median (M)	Mode (D)	Mode size	Minimum	Maximum	Range (R)	Standard deviation (SD)	Coefficient of variation (V) (in %)
Competition processes in the domestic market	Q	134	4.51	5	5	62	2	6	4	1.088189	24
	C	134	4.24	5	5	68	2	6	4	0.997584	23
Competition processes in international markets	Q	134	4.57	5	5	54	2	6	4	1.099882	24
	C	134	3.61	3	3	64	1	6	5	1.213399	33
Activity of international companies	Q	134	4.04	4	4	44	1	6	5	1.142913	28
	C	134	4.40	4	5	54	3	6	3	0.885297	20
Benchmarking	Q	134	3.19	3	3	68	2	5	3	0.853807	26
	C	134	3.55	4	4	60	2	5	3	0.922298	26
Cabotage markets	Q	134	3.88	4	5	42	1	6	5	1.280535	32
	C	134	4.72	5	5	46	3	6	3	0.993300	21
Qualified and educated staff	Q	134	5.31	5	6	62	3	6	3	0.740026	13
	C	134	5.22	6	6	76	3	6	3	1.080530	21

Source: the author, based on own research results

The analysis of relationships between quality and competitiveness demonstrated that the highest fit of the model was achieved for the competition processes in the domestic market (Table 4). It is interesting that there was a moderate, positive correlation observed between quality and competitiveness as affected by the factor: qualified and well-educated staff. This factor was the highest classified attribute of quality and also had the greatest importance in building the competitiveness of the road carriers. Quality determined 30% of the variation of competitiveness.

Table 4. Correlation and determination coefficients of factors affecting quality and competitiveness

Factors affecting quality and competitiveness	Pearson's correlation r coefficient	Determination coefficient R ²
Competition processes in the domestic market	0.68	46%
Competition processes in international markets	0.51	26%
Activity of international companies	0.65	42%
Benchmarking	0.61	37%
Cabotage markets	0.37	14%
Qualified and educated staff	0.55	30%

Source: the author, based on own research results

The processes of competition in international markets yielded a moderate, positive correlation between the quality of services and competitiveness of enterprises. Similar results were achieved from the analysis of the effects of the activity of international companies and benchmarking. An increase in their importance was shown to moderately affect the growth of competitiveness. Benchmarking, which according to the respondents had no effect on the quality and competitiveness of transport companies, caused a moderate, positive correlation between them.

At the next stage of the statistical analysis, the process of business activity internationalisation was defined and its importance to the service quality and competitiveness of carriers was analysed. The internationalisation process was defined as the set of all of the discussed factors, whereas in the analysis of variance use was made of the mean computed based on the ratio of all mean scores given to the analysed factors to the number of factors (n=6). This mean value allowed establishing the significance of the internationalisation process in quality and competitiveness development. Results of the statistical analysis proved that this process was an attribute of both quality ($\bar{x}=4.25$) and competitiveness ($\bar{x}=4.29$), and that there were no statistically significant differences between mean scores (Table 5).

Table 5. Results of the one-way analysis of variance of the mean scores of quality and competitiveness in the context of the internationalisation of business activity

Source of variance	SS	df	MS	F	Value of -p*	F Test
Between groups	0.106136	1	0.106136	0.294864467	0.587574714	3.876655
Within groups	95.74627	266	0.359948	-	-	-
In total	95.8524	267	-	-	-	-

*p < 0.05000 denotes a statistically significant difference in mean scores of variables

Source: the author, based on own research results

Internationalisation of business activity determined a moderate, positive correlation between quality and competitiveness (r=0.59). The increasing importance of the internationalisation processes to the quality of services will only moderately stimulate their increasing role in the process of competing for contracts. The quality of services explained 34% of the variation of competitiveness of freight road carriers.

Conclusions and discussion

This study demonstrated a positive correlation between quality and competitiveness in transport business internationalisation. It identified the significant role of internationalisation on the quality of services and competitiveness of road transport companies from Poland. Most of the analysed factors were perceived as having a significant effect on quality (4 out of 6 factors) and competitiveness (4 out of 6 factors), which should be viewed as a positive finding. The greatest importance in affecting quality and competitiveness was attributed to the factor: well-educated and qualified staff (respectively $\bar{x}=5.31$, $\bar{x}=5.22$). As far as quality is concerned, competition in international markets ($\bar{x}=4.57$) and in the domestic market ($\bar{x}=4.51$) were the next two highest evaluated factors. Considering competitiveness, the next highest ranked factors were cabotage markets ($\bar{x}=4.72$) and competition in the domestic market ($\bar{x}=4.24$). The absence of benchmarking among the attributes of quality and/or competitiveness was an unexpected finding. An opportunity to observe practices of large and experienced transport carriers might set desirable directions in the development of smaller enterprises.

Liberalisation of markets had a positive effect on the development potential of Polish road transport companies. This is confirmed by the EUROSTAT statistics (Road Freight Statistics – cabotage, 2018), which show a high share of Polish companies in the EU transport market. The subject structure of the sample is consistent with the structure of all Polish road transport carriers, although it should be noted that the survey included enterprises from only one of the 16 Polish provinces. The sample was predominated by micro- and small enterprises. Inclusion of large enterprises into the sample could affect the results of the survey. Therefore, it would be interesting to conduct studies including large companies and to compare the results. In addition, there is a shortage of empirical studies pertaining to the attributes of quality conducted among both customers and contractors. This delineates a new area of research. However, the current research results bring us closer to the possibility of outlining a certain regularity which describes the relationships between quality and competitiveness.

For transport companies, the internationalisation of their operations earmarks some motives for development and, at the same time, it sets the conditions in which they need to compete for contracts. Once a company has implemented an adequate course of action, tangible economic and market-related outcomes can be expected. It should be mentioned that inter-branch competition will play an increasingly important role in the struggle to acquire customers. The sustainable transport development that the EU promotes, as well as the assumptions of the White Book (2011), supporting ecological means of transport, will influence the structure of the freight transport. The potential development of the One Belt One Road (the new silk trail) should also not be ignored. Its planned geographical route will affect the transport system in Poland. If it crosses Polish territory, new conditions could emerge for the transport systems in Poland. The structure of the freight transport inclining towards rail transport (and to a lesser extent towards inland waterways transport) would force road carriers to change their strategic directions. Considering the above, future studies ought to take into consideration the influence of internationalisation and globalisation on changes in the branch structure of transport. Should the role of road transport be reduced to shuttle deliveries, average distances covered by road vehicles could be shortened drastically, which would affect both the competition processes and the quality of services. Greater competitiveness of rail transport (modernisation of point and linear infrastructure as well as trains, in response to the internationalisation in the context of contemporary transport policy) and the pressure to develop intermodal transport will significantly influence the operations of international road carriers.

In the nearest future, two factors (processes) will significantly influence road freight transport in EU: Brexit and Mobility Packet (MB). They are very closely related to the process of internationalisation. They will bring new competing conditions which may affect price competitiveness of carriers from Middle and Eastern Europe. This research may be a platform for discussion on contemporary road freight market, the role of internationalisation in developing service quality and building competitiveness in the European context. The research result may be still

actual. However, in 2020 the new terms of operating in international markets may change carriers' experience of internationalisation. The added value of this research is giving the basis for comparative studies. Implementing administrative and legal instruments in EU (MB) will force road carriers to change market strategies, adopt to the new rules, search for non-price competitive advantage and improve quality of services in order to satisfy expectations of customers in international markets.

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Malgorzata KĘDZIOR-LASKOWSKA, PhD is a lecturer in the Department of Market and Consumption at Warmia and Mazury University in Olsztyn. She graduated PhD from the Faculty of Economics of Gdansk University. Research interest: transport markets and infrastructure, road freight transport economics, determinants of transport sustainable development.

ORCID ID: orcid.org/0000-0003-0651-7740





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IMPACTS OF MODERN TECHNOLOGIES ON SUSTAINABLE COMMUNICATION OF CIVIL SERVICE ORGANIZATIONS

Mindaugas Laužikas ¹, Aistė Miliūtė ²

¹*Vilnius University Business School, Saulėtekio Av. 22, LT-10225 Vilnius, Lithuania*

¹*Global Innovation Learning Ecosystem (GILE) Experts, Corradino Industrial Estate, Paola, Malta*

²*Vilnius University Business School, Saulėtekio Av. 22, LT-10225 Vilnius, Lithuania JSC AKVAVITA, Neravų st. 100, Viečiūnai, Lithuania*

E-mails: ¹ mindaugas.lauzikas@gmail.com; ² aiste_miliute@yahoo.com

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Abstract. The role of modern technologies on competitive advantages of organizations is extensively analysed by many scholars or studies (Wascher et al. 2018; Maduro et al. 2018; Accenture, 2019). In order to sustainably communicate and meet stakeholders' expectations (Hovland, 2005; Macnamara, 2015; the UK Government Communication Plan 2017/2018; Bahena-Álvarez et al. 2019), both private and public organizations (including civil service institutions) implement technological innovation and apply modern communication tools (including a spectrum of digital marketing techniques); however, many factors, such as limited financial autonomy, dependence on political priorities, heavy bureaucracy and complicated jurisdiction or simply insufficient technological knowledge and competences (along with modest innovation systems and inefficient monitoring) make the present topic relevant to civil service organisations of Central and Eastern European Countries. The research question is **how to unleash potential of modern technologies in order to make civil service organizations' communication strategies sustainable and value-adding**. Instead of artificially separating communication worlds of private and public sectors, the present publication is focused on combining the best communication strategies (Ferguson et al. 2016) from different angles, such as business intelligence, financial analysis, social innovation, digitalization, innovative Human Resource Management, and etc. **The semi-structured qualitative experts' interviews** help examine the process of applying modern technologies (including digital marketing communication techniques) in practice of civil service organizations as well as provide the guidelines for communication strategy improvement. **The conceptual matrix of technological effects** is backed by qualitative research results, which is of significant value-added to future success and sustainability of communication strategies of CEEC's civil service organizations.

Keywords: communication sustainability; technologies, digital communication; civil service organizations

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1. Introduction

Based on a number of scholars, such as Husain (2013), Bhatnagar (2014), Luthra and Dahiya (2015), Shanga et al. (2017) or McEwan et al. (2017), communication efficiency plays a critical role in sustainable development of organizations, and its success is related to a set of criteria, such as application of modern technologies (IT, Mechatronics, and etc.), innovation and networking processes, leadership, and/ or communication management models. For instance, digital marketing and, in particular, digital communication instruments (which in the present publication refer to the examples of modern technologies) are considered among the key priorities in order to smoothly interact among stakeholders. Moreover, digital communication competences should be continuously enhanced to make communication more flexible. Learning from mistakes and being accountable to society (with respect to strategy development and execution) calls for continuous interaction with stakeholders (while engaging citizens into decision-making process), monitoring, and preparing accountability reports. Therefore, organizations are under pressure to communicate flexibly with society, while digital marketing (including Social Medias), video advertising (particularly via mobile technologies), webinars, online forums, live interactive conferences, are only a few examples of modern communication techniques which make the communication and marketing strategy more efficient and socially engaging. Sustainability also refers to consistency and continuity, which might be rather challenging in countries undergoing numerous reforms.

Apart from artificial intelligence and modern technologies, talented communicators remain critical intermediaries within external communication, and their talent must be upgraded to technologically more intuitive communication style. A great number of scholars (Tene and Polonetsky, 2014; Diakopoulos, 2016; Etzioni and Etzioni, 2016) emphasize the role of new technologies within communication: technologies make communication more visible; therefore, dissemination of internal communication is of significant value and might be a challenge for organizations with somewhat taller hierarchy. Efficient communication, thanks to new technologies, might help strengthen social image, engage society, create community (particularly when social trust is 'broken'), cut costs and information asymmetry, as well as increase employee motivation and satisfaction (Abel et al. 2016, Taylor et al., 2017; Otterlo, 2017).

In light of emerging role of big data management and business intelligence tools on the performance of modern organizations (along with the use of Social Media and digital marketing), human capital remains a key driver of innovations processes. Many of modern communication efficiency tools are rapidly evolving and calling for life-long learning: educating how to use technology in organizations across different industries and economies. For instance, digital marketing efficiency is bit by bit becoming a key strategic axe of vaster marketing and strategic management, because it is tightly related to communication strategies; however, communication leaders should be sufficiently knowledgeable and intelligent in order to combine these inter-related communication aspects and technological tools in their performance.

The multi-facet application of modern technologies in strategic development of organizations is in parallel marked by a diversity of technology effects on sustainability of civil servants' communication, mainly to a lack of experience and modest competences of applying modern communication tools in practice, along with insufficient attention to modern communication technologies within policies and political priorities. The diverse technology effects on communication sustainability might be tackled from the perspective of value-added through using efficiency-related terms, such as marketing, technical or economic efficiency.

The analysis of these key-words might back to the nineties, when interpreting Chahal' and Gill's (1991) insights, Kanakaraj (2010), argues that marketing efficiency is comprised of economic efficiency (which is oriented to

competition conditions, pricing, and competitive advantages) and technical efficiency. Thus, pricing or economic efficiency in general relate to functional efficiency or to a degree of competition in the market. Lipsey et al. (1993) identify two types of economic efficiency: productive efficiency and allocation-based efficiency. Trading and pricing affect competition, while competitive and fare distribution of prices ensures remunerative and value-adding prices to various economic agents. Technological innovation lead to competitive advantage in terms of capacity, time, expenditure, quality, brand, and many other effects that are also significant among civil service organizations. In order to better understand the effects of modern technologies on communication sustainability of civil service organizations, the matrix of technology impacts is developed (which is tested by applying qualitative research methodology). See Figure 1.

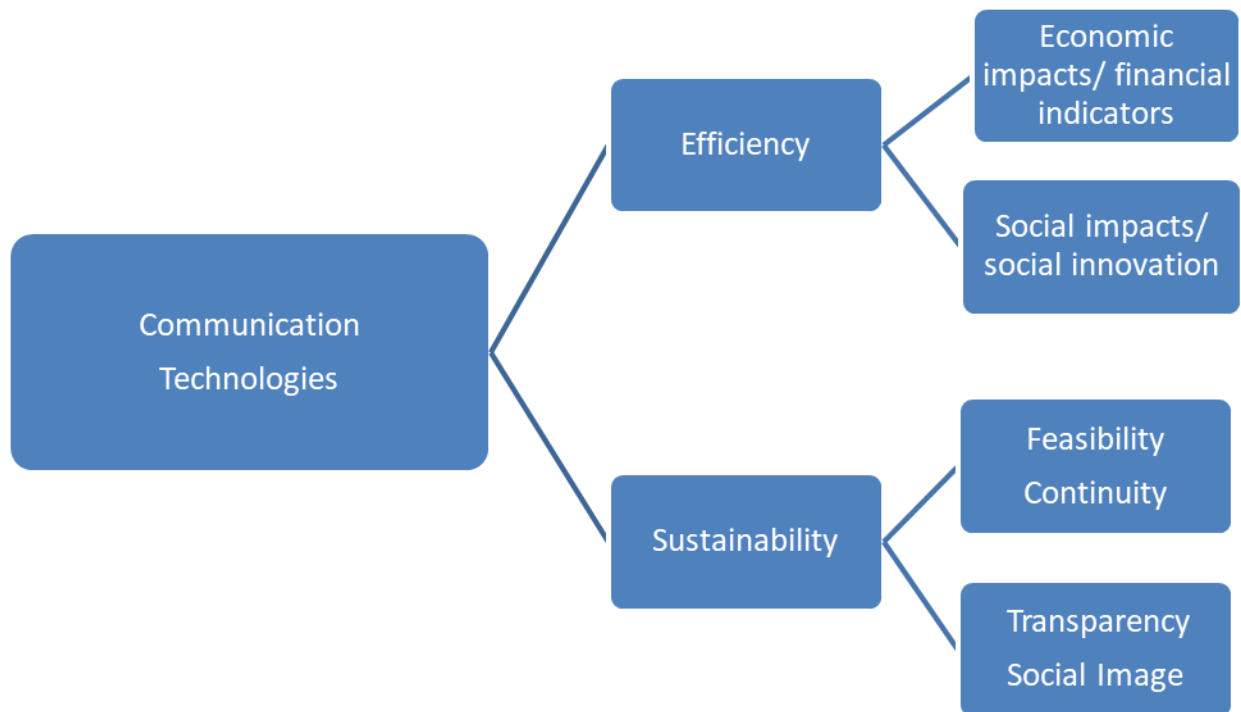


Figure 1. Matrix of Technology Effects on Communication Sustainability

Source: prepared by paper authors

Technologies manifest in modern organizations in different forms, such as robots, digital hubs, artificial intelligence, open source innovation, mobile application services, and etc., which not only change the communication of modern organizations, but also draw attention to cultural and social norms (for instance, social trust among stakeholders), evolved collaboration phenomenon (shared value economy; intensity, scope and various ways of interaction among partners) or competitive advantages via a vast spectrum of synergy effects. To profoundly examine the communication sustainability during the time of technological change, the next chapter is centred on the marketing effectiveness and efficiency, which nowadays is tightly related to digital marketing and modern communication technologies.

2. Marketing and communication within technological evolution

Driven by technological innovation and significant effects of technologies on economic and social wealth, marketing techniques (with its new forms and tools) remain among the most important interaction ways among various stakeholders. While overweighing some earlier researches on marketing efficiency versus effectiveness, a somewhat stronger focus on economic impacts of marketing is witnessed. Some of the scholars refer to marketing efficiency while analysing operational efficiency and tackling marketing inputs/ expenses or possibilities to minimize the cost of physical operations (Kohls, 1956). Lau and Yotopoulos (1971) add the concept of technical efficiency, which is measured by magnitude of outputs an organization can generate by using its inputs. Thus, production is oriented to efficient use of existing technology and resources to produce larger outcomes. The scholar revealed that efficient marketing should derive from operational and economic efficiency. Therefore, marketing efficiency could be translated to higher utility with the most efficient usage of scarce resources.

Based on Daukševičiūtė et al. (2011), marketing efficiency refers more to return on marketing expenditure. While examining marketing effectiveness these authors advice use of both financial and non-financial metrics. Similar as marketing in a more generic sense, according Kotler and Keller (2009), marketing effectiveness depends on a set of aspects, such as the consumer philosophy, integrated marketing and communication systems, strategic orientation, operative strategy, organizational imperatives, and etc.

Gao's (2010) introduced Integrated Model for Measuring Marketing Performance (MMMP) shows that the marketing effectiveness measurement is a complex process which should reflect both the current state of an organization and its future changes. Kotler and Keller (2009) emphasise retrospective analysis of organizational performance in order to improve future business strategy. Thus, modern organizations should address management functions, such as quality and monitoring management, which could contribute to communication sustainability of organizations. According to a number of authors, such as Petersen et al. (2009), the marketing strategy should be linked to financial analysis, as it demonstrates concrete pertinent results and value-added which is generated during the analysed period or development cycle of an organization.

Solčanský et al. (2011) draw attention to financial metrics, including indicators, such as ROI, ROE or ROMI, data analysis and reports of costs, revenues and profit margins, whereas non-financial metrics refer to comparative studies, customers' satisfaction, loyalty, and/or customer lifetime value. Milichovský et al. (2011) add the classification of marketing metrics: financial indicators (turnover, profit or return indicators), market measures (market share and etc.), customer behaviour measurement (e.g. loyalty, number of new customers, and etc.), measurement of image among customers (e.g. customers' satisfaction, brand recognition), measurement of direct customers (levels of distribution, returns from intermediaries), measurement of innovation (numbers of new products, share of new products on earnings). Moreover, Sampaio et al. (2011) identifies ten most relevant metrics: strength of brand or knowledge about products; commitment to purchase, consumer satisfaction, the market share, the number of complaints, the perceived quality, profits, ROI, sales growth, and service/product availability. Many of these indicators might be used in both private and public organizations.

Although ROMI (Return on Marketing Investment) could be expressed as a percentage of net profit and costs, it differs from ROI (Solčanský and Šimberová, 2010), because marketing investment activities are not identical to general business investments. Young and Aitken (2007) define marketing ROI as a process of creating positive value for business as well as reaching the actual cost effectiveness. Such indicators in a more limited extent can be efficiently used in public administration organizations. For instance, dissemination campaigns in various projects of civil service organizations can be based on similar indicators.

Although marketing metrics provide the means to track progress, demonstrate accountability, and help improve efficiency of marketing activities, it is important for marketers to be flexible and capable to easily reshape the

marketing strategy in order to compete in the changing marketplace. Thus, Marketing budgeting and planning should be directly related to economic and social impacts, as well as communication efficiency. In 2009, Bates added, that digital technologies and associated networks were rapidly changing media and information markets, cost and value structures, and consumer attitudes and expectations (with stronger focus on content). This aspect is still relevant and critical for communication sustainability of civil service organizations.

Grant (2012) accentuated the role of specificity of an industry and its specific context, while efficiency was interpreted from a more holistic perspective. For instance, while monitoring Coaching performance, financial indicators, such as ROI, do not fully capture outcomes of this specific activity. On the contrary, the financial focus can trigger job-related stress and anxiety; thus, well-being and engagement framework is suggested. This Grant's framework could be particularly useful in civil service organizations. To continue, apart from traditional efficiency indicators, civil service organizations should emphasize more innovation commercialization success indicators, social impacts, the value-added of each partner, and consistency/ sustainability of communication (including aspects, such as society engagement, community gathering, combination of high-tech and low-tech, stakeholders' satisfaction, and many others).

To continue, focus on many financial efficiency indicators (related to dividends, bonuses, pricing ratios, and etc.) might imprison companies in short-term plans, while the long-term value (such as the upside potential of the share price, communication sustainability, brand innovation, and etc.) might be neglected. MacDonald and Sulsky (2009) introduce a context-specific approach for enhancing the effectiveness of performance management. Relying on arguments of authors, such as Hogan, Jarro, Teo and Warachka (2003), a large number of empirical studies focused on stock prices versus the efficient market phenomenon, which can indirectly contribute to better understanding of communication efficiency and sustainability.

As it was investigated by Jegadeesh and Titman (1993), within trading strategies of buying the well-performing stocks and selling poor-performing stocks, there was an average excess return of 12% per year calculated, based on a standard capital asset pricing model. Lakonishok et al. (1994) reached a similar conclusion by analysing glamour stocks via such variables as price earnings ratios, dividends, the book to market value, cash-flows, and sales growth. Thus, many factors, such as dividends, earnings, the stock price or the number of outstanding shares have influence on average returns. Fama (1998) added that it was critical to choose a sound statistical methodology to better monitor the performance and reach sustainable results in the longer run.

Given the specificity of civil service organizations, measurement of returns (it is interpreted more as value-added or economic and social impacts), discrepancies between expected outputs and factual results (which might refer to feasibility) remains of significant value, while the economic performance indicators should be adapted to a context of socially vulnerable groups and political priorities (with more emphasis on social impacts of public policies). Zaimova et al (2012), suggest key success factors of implementing and coordinating social policy: monitoring of the service quality and promoting entrepreneurial solutions.

Having a list of scholars' works analysed from the perspective of finance, it is worth focusing on marketing efficiency and effectiveness from the perspective of information technologies, as technological progress and the emerging business intelligence phenomenon changes communication style among stakeholders; thus, it is tempting to examine the liaison between marketing and IT. For instance Zhu (2015) shows that IT and marketing effectiveness are both positively correlated to productivity while efficiency is not significantly correlated to effectiveness: productivity calls for efficient use of IT and Marketing expenditure, while allocation of resources is related to budgeting. It is added, that the use of budget more than scope of it has a direct relation to performance. Within the analysed global hotel industry, the author recommends paying more attention to a profound analysis of IT and marketing expenditure, along with extensive analysis how these resources are used.

Jain and Yadav (2017) go one step further while overviewing the evolution of marketing and measurement of impacts of marketing technologies. According to the authors, more interactive and participative communication with stakeholders (via technologies) makes marketers dependent on digital media devices, such as smartphones and computers, as well as influenced by continuous collaboration with stakeholders in creating value-added and commercializing innovation. Apart from many positive effects (such as engagement in decision making), Jain and Yadav (2017) argue that amalgamation between technology and marketing requires bigger expenditure (for instance in the area of R&D) and the necessity of faster and often riskier decisions, based on the context of scarcer time and bigger data. Therefore, innovation becomes a right blend within combination of marketing and technology.

The topic on the role of digital marketing tools on organizational performance has been consistently tackled for c.a. 2 decades; for instance, it is worth mentioning results of the State of Digital Marketing Survey (2011), prepared by Webmarketing123, where the largest part of marketing experts stated that website traffic is a common success indicator among both B2B and B2C digital media campaigns. Among other indicators experts underlined lead generation, website clock-through rate, sales, call-to-action conversions, brand awareness, and many others. Many of these indicators evolved, but they are still relevant.

Analysis of success of digital marketing programs implies a set of indicators which refer more to effectiveness rather than efficiency; however, they are relevant and important in the competitive market. Pagani (2013) first of all links digital business strategy to value creation, while digital marketing communication peculiarities (including main channels and modern techniques) are tackled by a great number of authors, such as Acar and Puntoni (2016), Fortin and Ning (2017), Bruhn and Schnebelen (2017). Some scholars, such as Batra and Keller (2016) emphasize the role of Integrating Marketing Communications, as modern organizations should focus on enhancing both “bottom-up” and “top-down” communications models.

Thus, the majority of these approaches to digital marketing communication refer to the level of customer’s response, compared to the associated cost base; but they all can be applied in both business and civil service organizations. There is a rapidly growing interest in digital marketing as a set of practical tools to generate a bigger economic value-added for organizations (Bala and Verma, 2018). Responses could be translated to Clicks (the number of times the user clicks an advertisement), Clicks To Call (the number of times the user initiates a call by clicking on a link), Click Through Rate (the number of users who have clicked on an advertisement, compared to the number of impressions), Cost for Thousand Impressions (the cost an advertiser pays for thousand impressions of an online advertisement), Cost Per Click (CPC) (the price an advertiser pays every time the user clicks on an advertisement), and many others. In spite of a great variety of digital marketing tools, every investment requires an efficient evaluation method, which is flexible towards yet undiscovered risks and volatile returns (Bruhn and Schnebelen, 2017).

The comparison of peers’ projects, activities, companies and methods always help to choose the best alternative or increase the efficiency of further investment. Thus, understanding fundamental principles of investment finances and being able to apply them in practice is crucial for any organization. Investments in digital marketing efforts in civil service organizations are not an exception. On the contrary, digital marketing brings many indirect effects that could be turned into value-added (for instance, the increase in number of citizens engaged, a stronger brand and image, the percentage of recommendations and innovative ideas coming from society, synergy effects among stakeholders, and etc.).

Saura et al (2017) point out at another important organizational challenge within digital marketing which is the necessity to continuously and rapidly realign the knowledge and skills of digital marketing with the context of the market and technological evolution. The authors find out that there is a gap between competences of monitoring and assessing marketing actions in digital marketing, which reveals the lack of knowledge on strategic orientation

of an organization; therefore, digital ecosystem marketers should be trained to understand and use context-specific key performance indicators while combining them with more generic strategies and linking them to more traditional tools of marketing monitoring.

In light of stronger amalgamation between marketing and technology in order to position an organization closer to citizens, modern organizations have bigger pressure to generate social value-added. As for instance, by using Domini400 Social Index, Dow Jones Sustainability World Index and FTSE4Good Index, Carini et al (2017) conclude that CSR firms have better long-run performance, thanks to the reputation effect, which also positively affects sales volumes and profits, as well as long-run cost base. Singh et al (2015) back the social value of marketing within entrepreneurship while emphasizing the specificity and context of the market (including socioeconomic conditions, technological literacy, culture, and social structure of the target audience), social marketing strategies (which should match the local requirements), and the technology in terms of both innovation and distribution. The authors argue that customer orientation is important in all types of organizations (non-profit, not for profit, or for-profit), thus their implications might be useful for civil service organizations. However, reinforcement of public policies via guidelines and acts would be of significant help.

For instance, while examining social value in the UK construction industry, Cartigny and Lord (2017) refer to the term of Social Capital (accumulation of human labour regarding social networks and trust) at individual and community levels. According to the authors, the UK Construction industry cannot reach political priorities of social value at a community level, but individual social value-added could be measured by jobs and training opportunities which might enhance individual social capital and enable them to network with others. From the communication point of view, French (2017) expands the value-added phenomenon by non-financial motivation via engagement of employees and society and mitigation of the negative effect of economic performance optimization through innovation encouragement tools, creativity enhancement, and creative leadership (French, 2017). This interpretation of efficient performance is relevant for both, private and public organizations; thus, civil servants should apply the combination of economic and social value-added to make the communication more sustainable (continuous and consistent), whilst modern technologies, including digital marketing communication tools, could facilitate the knowledge share, strategy development and execution of various policies and strategies among stakeholders.

3. Methodology: semi structured interviews with leaders of civil service organizations

Internal communication efficiency refers to a set of dimensions, such as speed, feasibility of various projects, generation of innovative ideas and innovation commercialization process, creative leadership, employees' satisfaction, and etc. (Macnamara, 2015), while external communication is driven by key liaisons with other strategies (Marketing, R&D or Internationalization), cultural and social norms (as part of social capital dimensions), cooperation activities (including main synergy effects among stakeholders), as well as social value-added (Hovland, 2005). Therefore, modern technologies could improve communication efficiency in many areas. While selecting methodology and building research questionnaire, it is intended to avoid of artificial cleavage between communication in business and public organizations, as modern technologies trigger similar challenges and trends across various industries and economies; therefore, civil service organizations' leaders should not diminish the experience of private companies (Ferguson et al. 2016). Moreover, communication technologies should facilitate horizontal communication, enhancement of creativity system, and knowledge sharing within teams (the UK Government Communication Plan 2017/2018).

The literature review led to the concluding matrix of technology effects on communication sustainability, which was later on tested within semi structured interviews with 20 experts from Lithuanian civil organizations (mainly occupying managing positions in various ministry departments). The questionnaire was built while relying on various scholars' argumentation and positive experience of other countries. Taking into account the key

dimensions of the present publication (which are technologies and communication sustainability) the main focus was on how these two factors are inter-related: what outcomes can be expected in civil service organizations via applying modern technologies in practice.

The qualitative research was centred on coding the experts, based on their diploma, duration of working in civil service, and competences in communication technologies. The answers were regrouped and interpreted in order to test the matrix (developed by the authors in the previous chapters), which served as the theoretical framework for the interviews. In total valid responses were collected from 20 civil service leaders.

Given a vast diversity and scope of technology effects on communication, the results of semi structured interviews help answer the research question, as well as deepen the knowledge on Lithuanian civil service agents: whether they acknowledge or not the role of technologies and various innovative communication techniques; if they have sufficient knowledge on how to apply these instruments in practice, as well as a necessary number of educators/ consultants surrounding them who could teach how to use these technologies in digital marketing and communication innovations. Moreover, the research reveals how Lithuanian civil servants measure communication efficiency and sustainability. Thus, semi-structured interviews supported the theoretical implications and helped test the developed conceptual model/ matrix, which could be further used in other countries or industries or tested by applying quantitative methodologies in the next publication of the same series.

4. Preconditions and measurement of communication sustainability in civil service organization: the role of technologies

Having the evolution of the 'Efficiency' concept overviewed within the previous chapters (where modern communication efficiency theories refer to both economic and social value-added), going further, it is intended to examine how modern technologies (including digital marketing communication techniques) are applied in practice of civil service organizations while referring to a set of critical questions:

- Do the leaders of Lithuanian civil service fully acknowledge the role and effects of digital communication (knowledge, skills, and perception)?
- Is the sustainability respected and monitored, and do experts know how to use technologies in the time of change?
- Do and how the interrogated leaders of civil service organizations measure communication efficiency?
- How do civil servants link technology-based communication with political priorities, available inputs/ budgets, and strategies?
- Are stakeholders involved in digital networks of civil service organizations?

The qualitative research led to pertinent findings which were in line with scientific literature analysis and revealed the role of technologies on communication sustainability of Lithuanian civil service organizations. Based on the research results, technologies (including digital marketing) affect one third of the interviewed ministry representatives: with no respect to their communication experience the experts emphasized the opportunity to improve social image via Social Medias. A great number of tools, channels and characteristics (such as the quality information on Facebook, interesting news and educative sessions on YouTube, life interactive dialogue with citizens and other stakeholders via webpages, content marketing, and online games) were mentioned, driven by their intention to improve transparency and social image.

Experts underline, that while sharing the information on various ministry activities (including progress reports) via social networks, ministries should ask citizens for advice in order to create stronger community spirit and engage society. Moreover, civil service organizations (including various ministry departments) should publish

relevant and innovative G2C-driven (Government to Citizens) articles online and directly consult/ educate people and other stakeholders in various topics. Two interrogated experts emphasize that nowadays' success stories and projects should be presented in an innovative and engaging way (for instance, videos, social events, and etc.); society should be involved in dissemination activities and innovation processes via participative marketing, open-source innovation, and new technologies. In parallel, citizens should be engaged in continuous monitoring and market research campaigns, while the main threats and challenges should be presented via digital marketing. The role of Social Medias, and more generically of technologies, was also emphasized in the context of non-financial reward: two interviewed respondents recommended presenting various activities, projects, results, best employees, and etc. via intranet and Social Medias. One employee accentuated the role of various celebrations, events, excursions, trips, which could help build social trust and community spirit inside and outside organizations.

According to one third of the interviewed ministry representatives, the internal communication in civil service organizations is not centred on technologies. It is interesting to note, that three experts with business administration-oriented education were more pessimistic about the progress in transferring the information into digital space, while applying various digital communication tools and signing documents with digital signatures. It could be explained by their more profound knowledge and skills, related to technological innovation and digital communication, which are part of business-oriented study programs and compulsory in modern companies. The other two respondents with public administration background accentuated the role of administrative structures and communication efficiency within these structures: internal communication should be centred on horizontal communication in virtual space while digitalization means (transferring information from paper format to digital data, using more interactive techniques, such as messenger, email, e. signature, doclogic, and etc.) should help improve communication within administrative structures. Moreover, internal communication should be linked to external communication via webinars, video, and online consulting.

Notwithstanding experts' commitment to improve internal and external communication via technologies, it is obvious that their knowledge and skills in communication technologies and human resource management are limited: 9 experts did not mention the role of Social Media at all, while the mentioned modern techniques were far away from technological innovations. On the contrary, many experts accentuated more simplistic tools, such as Intranet and Messenger, while no one mentioned digital hubs, CRMs, robots, and other forms of artificial intelligence. It is interesting to note that one expert differentiate communication style, based on management level: medium level managers face the necessity to communicate more frequently; however, the experts could not mention any additional communication tools, related to medium-level management.

Given inefficient use of modern technologies, civil service organizations face the necessity to use more traditional communication channels (TV, Radio, and etc.) to reach the target audience and improve their social image, which might cause information asymmetry and emerge as a barrier for building community and engaging society. Smart communication technologies, social digital hubs (which connect various stakeholders), mobile technologies, application software are modern tools to communicate externally and internally; while among the main technological communication efficiency criteria it is worth mentioning factors, such as a number of engaged people, a number of activities and the scope of projects/ events, communication intensity/ frequency, transparency, a number of complains and reviews, perception of services and social image, information asymmetry in terms of response time and feedback content, and many others.

Smart technologies in use by civil servants, in particular mobile applications, could present ministry activities, engage society and build community, which is critical for social image. Open source innovation-driven hubs and applications, social advertising, digital marketing should help attract and collect creative ideas from citizens, involve the youth in technological innovation and build stronger community. More than one third of the experts acknowledged the effect of transparency strengthening via modern technologies: it was mentioned by experts with

rather diverse experience in civil service organizations and rather specific connection to internal and external communication.

The civil servants with business education background emphasized the role of dissemination of on-going projects, activities, progress reports, and results via applications, digital hubs and social events. Driven by dissemination plans, the experts emphasized significance of engaging society, while asking clear questions and collecting stakeholders' feedback. A similar argumentation came from civil servants with Public Administration-related education: they emphasized the importance of dissemination via mobile applications, digital hubs, and social media networks; however, they also acknowledged the focus on budgeting for external communication, elimination of bureaucracy and 'bureaucratic jargon', as well as more frequent open-day meetings with society. Therefore, the combination between modern technologies and traditional communication ways should be established in civil service organizations, as the headcount is composed of employees of different age groups.

Similar technological improvement was mentioned by 4 civil servants in the context of internal communication: two of them emphasized amelioration of more traditional communication tools (such as Newsletters, Intranet or transferring the data from books to digital format, video conference equipment, and etc.); the other two respondents suggested the intensification of application of various software programs or interactive forums online. Only one expert identified the technological advantage of tracking the feedback of resigning employees in order to find out the main reasons of employee turnover: satisfying or dissatisfying factors of choosing a particular public organization.

Although scholars and approximately one third of interrogated experts agree that modern technologies help improve the transparency and social image, communication technologies are not interpreted in the context of holistic innovation culture (which consists of many important aspects, such as creativity system, knowledge diffusion models, psychological climate, lifelong learning opportunities or continuous talent development). All these aspects might be achieved via intermediary factors, such as a number of creative leaders, innovation sponsors and intrapreneurs, clear and well-established innovation processes, cultural diversity and cultural employees, good psychologists, as well as on-going modern technology-driven research and digital marketing campaigns. Therefore, in the context of innovation, communication is interpreted via knowledge and human capital-intensive aspects and requires innovative Human Resource Management.

Within monitoring models, it is worth mentioning a set of efficiency criteria/ KPI-s (which could be used as efficiency metrics), such as a number of creative ideas, a percentage of commercialized innovative ideas, innovation commercialization speed and popularity/social image of civil service organization, employees' satisfaction and social trust, a number of complaints and conflicts, as well as teams' sustainability and project feasibility. Along with a set of efficiency criteria, communication monitoring models should be oriented to different age groups, in particular to unique "Z" generation and the youth or socially more vulnerable elder people.

Taking into account a somewhat limited cultural diversity in Lithuanian civil service organizations, it should be useful to connect to Lithuanian people living abroad or foreign students studying in Lithuania, to prepare digital innovation newspaper in Lithuanian and English, reward citizens with the best innovative ideas, employ Erasmus students for internship, create innovative ideas banks inside an organization, engage society in this initiative, and focus more on social life (hobbies, informal meetings, and events out of work). Within civil service organizations, creative leaders should be identified and encouraged in order to contribute to communication sustainability via both use of technologies and enhancing healthy psychological climate of an organization. To continue, research results helped support the theoretical matrix of technology effects (which was presented in the previous chapters) by concrete observations and insights of Lithuanian civil service experts; thanks to the research, the matrix was adjusted accordingly. See Figure 2.

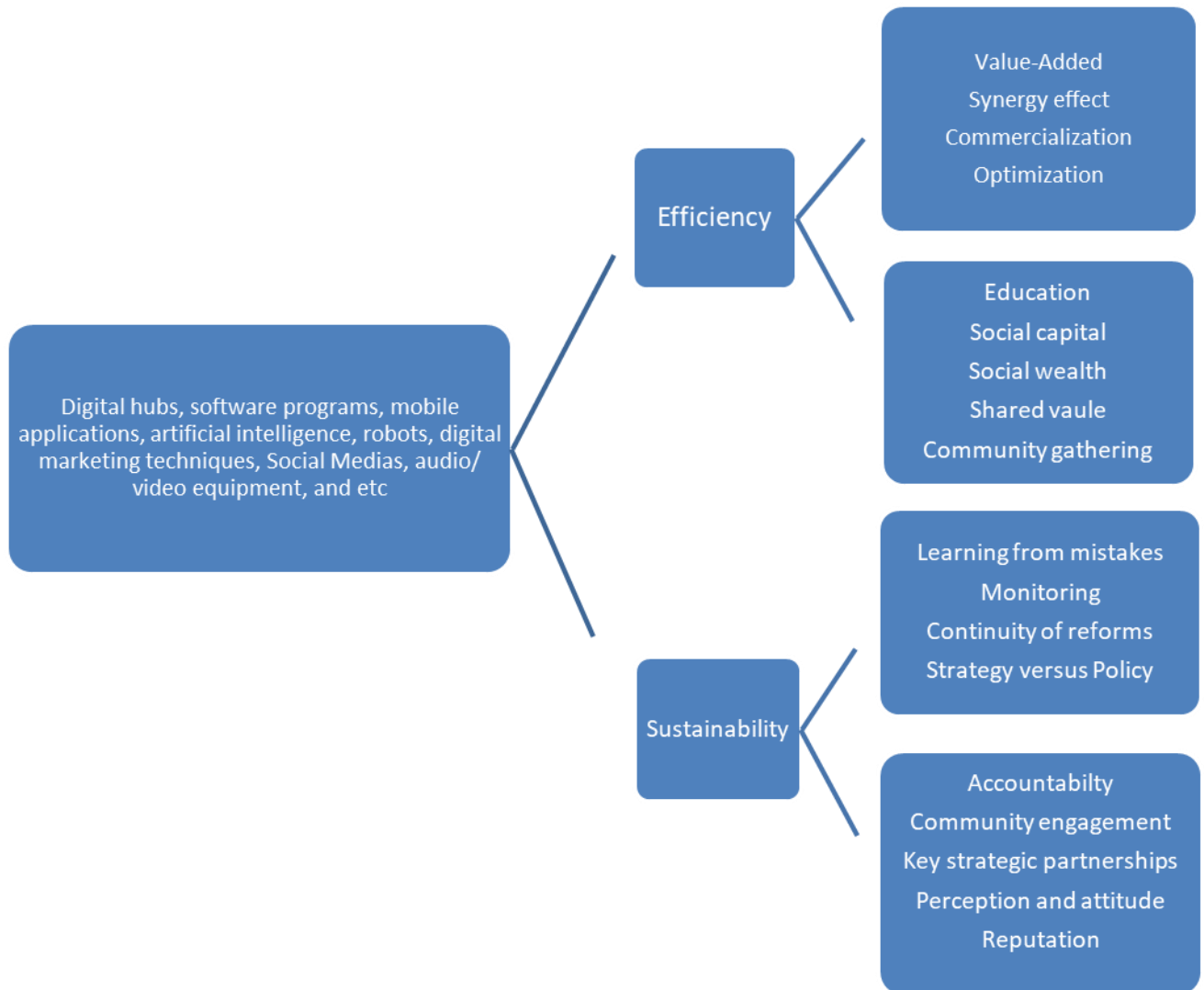


Figure 2. Matrix of Technology Effects on Communication Sustainability in Lithuanian Civil Service Organizations

Source: prepared by paper authors, based on research results

Although Lithuanian civil servants acknowledge the role modern communication technologies play nowadays, they also underline the lack of knowledge and skills of using these technologies in practice. Thus, the communication efficiency during the time of reforms calls for lifelong learning and practical/ entrepreneurial education in terms of technological literacy, digital marketing and IT: all these technology aspects could facilitate knowledge sharing, improve communication quality and synergy effect among stakeholders, as well as help generate higher social value-added.

Although experts admit that without efficiently using communication technologies it is unlikely to contribute to social wealth of citizens, reach political priorities and corresponding strategic targets (such as shared value economy, networking, and community engagement/ gathering), they also accentuate a big gap between political priority and their strategies in terms of the use of communication technologies, as well as a limited consistency of

political directions and reforms. Moreover, technologies could have a great influence on sustainability, which refers to continuity, transparency, social image and feasibility, if sustainability was exceeded via social capital dimensions (such as social trust, fear of failure, perception, attitude, and etc.) thanks to interactive communication with stakeholders (reaching them via digital hubs, mobile applications, video advertising, and etc.). Community gathering and engagement through technologies would also contribute to transparency, social image, perception, and attitude.

Conclusions and Recommendations

Notwithstanding that the literature on the role of technologies on communication sustainability is well established, the effects vary from purely financial results to non-financial, such as social value-added, community gathering or engagement; while Lithuanian Civil Service Organizations lack knowledge, experience and commitment to use communication technologies and techniques (including digital marketing) in practice, which jeopardize the smoothness and efficiency of internal and external communication. It is getting difficult to be transparent, engaging and satisfying other stakeholders without digital platforms, artificial intelligence, innovative software, mobile applications, and video advertising. Moreover, the society and key strategic partners bit by bit set higher communication standards as well as expectations towards civil service experts and their communication style.

An innovative Monitoring department of digital communication would be of significant value for civil service organizations with tall hierarchies and strict bureaucratic rules, while human resource managers should help develop or enhance employees skills in digital marketing, in particular of Social Medias, and communication technologies, as collaboration-driven projects emerge as predominant form of activities; therefore, technologies help mitigate potential risks, increase synergy effect among stakeholders, improve transparency, accountability and society engagement, as well as accelerate innovation process and progress.

In spite of bureaucratic constraints, insufficient financial autonomy and limited support from policy makers in the area of modern communication technologies, the creative leaders of Lithuanian civil service organizations should lead informal technology and digital marketing-related education programs, encourage more interactive dialogue with citizens and other stakeholders while contacting them via the most popular and user-friendly technologies (such as mobile applications or digital hubs), as well as enhance creativity systems and innovation climate, which might help facilitate technology innovation in the future. The applied economic and social value-added indicators of communication efficiency should be accompanied by a number of success criteria which could track cooperation synergy effect, society engagement, and community gathering.

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Biographical notes

Dr. **Mindaugas LAUŽIKAS** is a Professor at Vilnius University Business School, Doctor of Economic Sciences, Director of GILE Experts (Malta). Lecturing experience in countries, such as Georgia, Sweden, France, Spain, Italy, Malta, Moldova, South Korea and Lithuania, is supported by publications in the field of knowledge economy, entrepreneurship and innovation. Research interests: national systems of innovation, entrepreneurship, knowledge and innovation management, innovation and human resource strategies.

ORCID ID: <http://orcid.org/0000-0002-6113-7794>

Aistė MILIŪTĖ is a teacher/researcher at Vilniaus universiteto Verslo mokykla and entrepreneur within the mineral water and healthcare industries, a founder of AKVAVITA company.

ORCID ID: <http://orcid.org/0000-0002-9667-3730>

Register for an ORCID ID:

<https://orcid.org/register>

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INVESTMENTS TO THE PETROCHEMICAL SECTOR: THE VALUE OF THE COMPETITIVENESS OF PETROCHEMICAL COMPANIES

Tatiana Bondarenko ¹, Alex Borodin ², Makpal Zholamanova ³, Galina Panaedova ⁴, Tatiana Belyanchikova ⁵, Lira Gurieva ⁶

^{1,2} Plekhanov Russian University of Economics, 36, Stremyanny lane, Moscow, Russian Federation

³ Eurasian National University named after L.N. Gumilyov, 11, Educational building No. 5, Nur-Sultan, Kazakhstan

⁴ North-Caucasus Federal University, 1, Pushkin str., Stavropol, Russian Federation

⁵ Financial University under the Government of the Russian Federation, 49, Leningradskij prospekt, Moscow, Russian Federation

⁶ North Ossetian State University named after K.L. Khetagurov, 44-46, Vatutina Street, Vladikavkaz, 362025, Russian Federation

E-mails: ¹t.g.bndarenko@gmail.com, ²aib-2004@yandex.ru, ³makpalzh@mail.ru, ⁴afina-02@rambler.ru, ⁵maestra_@mail.ru, ⁶443879@mail.ru

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Abstract. The article focuses on the dynamics and structure of fixed investments in the Russian Federation in the period of 2011-2019, analyses both the destabilizing factors, and those, having beneficial impact on the use of a wide range of financial mechanisms in financing projects on petrochemical companies' development. It evaluates the competitiveness of petrochemical companies in the Russian Federation and abroad, for the current period and until 2030, according to the strategy of industry development. It outlines the investment potential of the industry and provides conclusion on the need to develop the use of mechanisms for financing innovative subprojects of petrochemical industry companies. All conclusions in the article are illustrated with relevant examples.

Keywords: competitiveness; financing mechanisms; financing; innovative development of the industry; investments; petrochemical companies

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JEL Classifications: G31, G32

1. Introduction

Russia is one of the leading oil and gas producers, however, its share of petrochemical production accounts for only 2% of the world total. Russian petrochemical production falls behind global leaders - China, the United States and Saudi Arabia by 5–8 times (Akishin, Tyrtoov, 2018).

Important trends facing the petrochemical industry around the world today are the problems of the resource base and geography: deterioration in the quality of reserves, decline in reservoir productivity, and attention to low-permeability reservoirs. The needs of the petrochemical market today is an approach when the company as a provider does not just provide a product and related services, but is ready to participate in the development of an investment solution for the task of its customer, accompany its implementation and share responsibility for the final result. It is precisely this model of development of the petrochemical market that will be further promoted as much as possible by commercializing joint developments (Grigorievna, Aleksandrovna, Vladimirovich, 2019).

2. Litreture review

There has been a large number of theoretical, methodological and applied research on setting development strategies for petrochemical complexes. This is due to changing trends, tools, development tendencies, and approaches to the financing of petrochemical projects in Russia and worldwide.

The issues of the management of investment projects received much attention in the works by such scientists as (Carlsson, Jacobsson, Holmen, Rickne, 2002), (Shuen, Feiler, Teece, 2014), (Luebeck, Petrov, 2018), (Borodin, Pyatanova, et.al., 2019) and others.

Fundamental works by scientists (Sterling, Murray, 2007), (Coenen, López, 2010) are also worth mentioning.

The process of investment planning in a changing environment is based on traditional foundations and uses information from open sources, and includes several stages of preparation of documentation in accordance with the main objectives of the financial planning regulation of the company, presented in Figure 1.

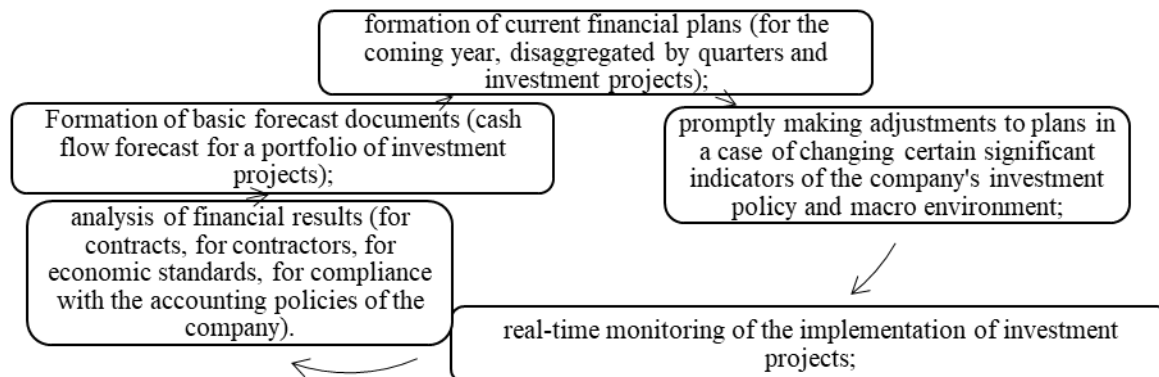


Figure 1. The process of investment planning

The process of financial investment planning (see Figure 1) is very time-consuming, as you go through all the stages (Dudin, Lyasnikov, Sekerin, Gorokhova, Danko, Bank, 2017), (Borodin, Veynberg et.al., 2019), the planned indicators are more deeply interconnected both among themselves and with the data of the external environment. The financial plans developed on the basis of these data serve as a guide (reference point) for financing the current and investment activities of the organization.

As part of financial investment planning, financial analysis methods (Menshchikova, Sayapin, 2016) will be used to determine the implementation of financial investment plans (see Figure 2).

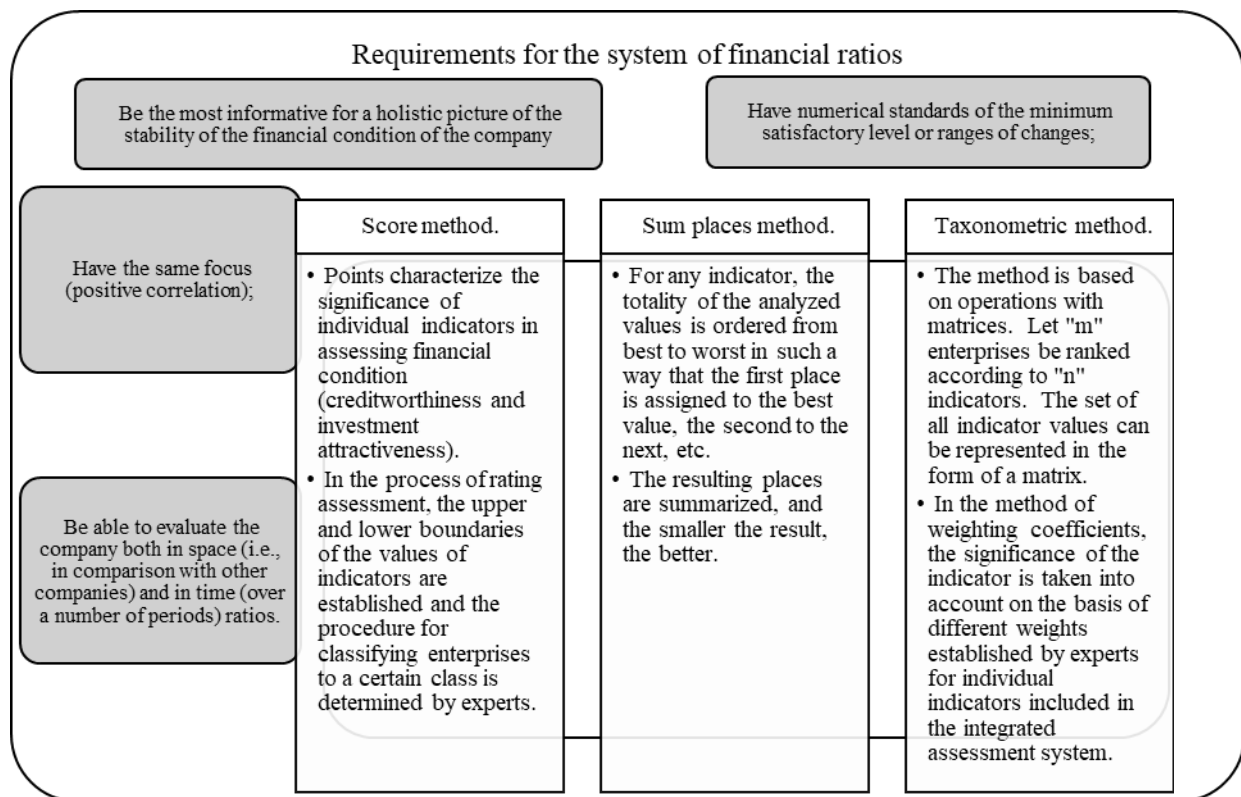


Figure 2. Financial investment analysis methods

The reality of indicators of financial investment plans largely depends on the choice of planning methods, their combination, taking into account the specifics of each (Dobrova, Danilochkina, Cherner, Dobrov, Dobrov, Sepiashvili, 2018).

It should be noted that each company develops a financial investment plan for its activities based on niche development, industry potential and its own internal individual standards, i.e. each uses its own specific methodology, allowing taking into account all the features of the business and the sphere where the activity is implemented. Of course, company managers should orient their business toward future financial competitiveness, but also take into account the need to remove unprofitable units or lines of business, identify those areas that do not correspond to the current level and require reevaluation. Justification of certain articles of financial investment plans, even in the most progressive ways, will not ensure the reality of the tasks if income and expenses are not balanced.

The methodological framework for setting up the investment planning system is quite wide. However, at the same time, the realism and reliability of the calculated indicators of financial plans largely depends on the set of selected methods of financial planning, which is a subjective value. The reality level of the obtained forecast data depends both on the human factor in making management decisions and on the developed and installed mathematical base in an automated accounting system that allows you to combine different methods taking into account the specifics of each.

3. Methodology

The article discusses the dynamics and structure of investments in fixed assets in the Russian Federation in the period 2011-2018. The state of the economy of the Russian Federation predetermined its understanding as a factor condition for implementing the development strategy of the chemical and petrochemical complex in the Russian Federation for the period up to 2030. The Russian petrochemical market is characterized as a market for complex and expensive processes that are not market products, burdened with infrastructure issues and the complexity of pricing, with limited a set of sources of raw materials. The conclusions formulated are illustrated in the dynamics of the development of petrochemistry both in the industry as a whole and on the example of the development of the industry in the Siberian Federal District, where a large amount of raw materials is concentrated and the prospect of increased financial competitiveness of this business is noticeable. A description of the problems by the degree of influence on the competitiveness of the main segments of the petrochemical companies revealed the conditions for the development of the investment potential of the petrochemical industry. The authors of the article present projects for the development of petrochemical companies in the Russian Federation until 2030, characterize the investment potential of the industry, make conclusions about the need to develop the use of financing mechanisms for innovative subprojects of companies in the petrochemical industry.

Let us consider the state of Russian economy as a factor condition for this strategy implementation. Since 2011, it was characterized by reduced consumer and investment demand, slowdown in the field of investment and industrial development, lower demand for domestic production, decline in purchasing power, which altogether led to the slowdown in economic growth, in general. It is necessary to emphasize the downward trend in the dynamics of fixed investments in the period of 2011-2015. In 2016, the negative trend was levelled out and a tendency towards recovery and increase in fixed investment growth emerged (see Figure 3). The relative stabilization of the macroenvironment in 2017 ensured the growth of real investment in fixed assets. The key drivers of growth were increasing the availability of credit as a result of lower interest rates, as well as improving the financial condition of enterprises: investments financed by own funds increased by 9.0% over the year.

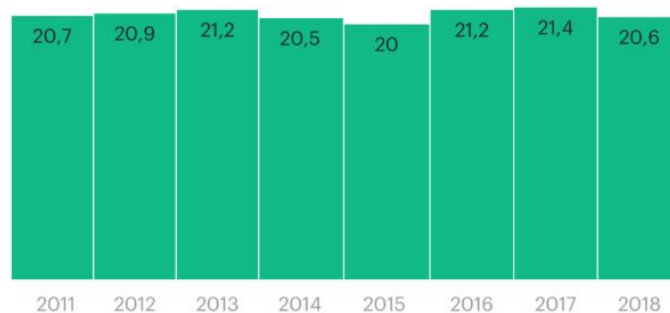


Figure 3. Dynamics of the ratio of investments in fixed assets to Russia's GDP

Source: Federal State Statistics Service http://www.gks.ru/free_doc/new_site/business/invest/tab_inv-vf.htm

In general, we can talk about a reduction in the ratio of investment in fixed assets to Russia's GDP. At the same time, the volume of investments in fixed assets in 2018 increased in real terms by 4.3% compared to 2017 and amounted to 17.6 trillion rubles, Rosstat said earlier. And real GDP growth amounted to 2.3%. It turns out a paradox: investments grow faster than GDP, but at the same time, the ratio of investment to GDP decreases. The contradiction (decrease) is due to the fact that the investment deflator has grown much weaker than the GDP deflator. Among the possible reasons for the restoration of investment dynamics, the stabilization of oil prices and favorable forecasts of economic growth could be indicated, as well as the observed signs of economic stabilization that positively affect changes in the index of entrepreneurial confidence.

The analysis of the data shows that despite the significant reduction in Russia's investment attractiveness both during the global crisis of 2008–2009 and poorly performing economy of 2014–2016, the general trends and structure of investment did not undergo substantial changes. In general, after the stabilization of the economic situation in 2013, the share of investments in machinery, equipment and vehicles in the structure of fixed investments reached a level of 38.8%. Thereafter, there was a serious decline, and in 2015-2017, the indicator achieved a 15 - year minimum and constituted 31.5%. Nowadays, this very segment is the targeted one for modern financial companies. However, considering the increasing competition, year by year, this segment continues growing, which forces financial companies to search and explore new markets. It can be assumed that through the implementation of a new technical strategy, Russian petrochemical companies will gain more than 130 billion rubles in financial effect by 2025 both from additional production and from an additional resource base that companies need to involve.

Thus, the main investment areas for increasing the financial competitiveness of petrochemical companies in the Russian Federation will be associated with the construction of technical centers for the development of polymer processing, where potential customers will be able to participate in the development and testing of new products and brands of raw materials.

The analysis of the data in Figure 4 shows the structure of fixed investments in 2018.

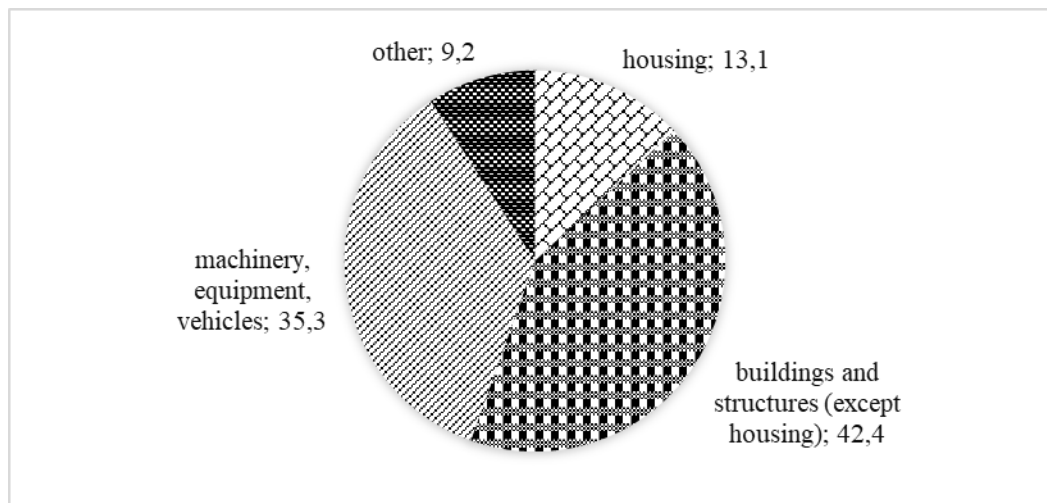


Figure 4. The structure of fixed investments in 2002-2017, by types of fixed assets

Source: Federal State Statistics Service

http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/enterprise/investment/nonfinancial/#

The deterioration of the economic situation in general, and of the investment activity in particular, can be explained by the fact that, since 2014, the negative trends in Russian economy escalated, and the currency crisis started as a result of the devaluation of the rouble against foreign currencies. The devaluation was caused by falling energy prices, as the revenues from energy resources made up a significant part of Russia's budget, as well as by the introduction of economic sanctions against Russia. Individual global companies reported on their disinvestment in the Russian Federation. The above-mentioned aspects affected the reduction of investment in general, led to withholding lending by foreign banks; the banking system introduced stricter requirements for potential borrowers, and the rates on borrowings increased, which reduced the potential capacity for innovative development of petrochemical companies in the Russian Federation through investment resources.

It is also essential to mention that the petrochemical market is the market of complex and expensive processes, which are not market goods. It is complicated by infrastructure issues and pricing complexity, and has a limited set of raw materials sources. All this allows to conclude on the weak investment and innovation position of petrochemical companies. Petrochemicals and polymer raw materials processing are far from being the strategic focus of most gas and oil refining companies, as the investments in such projects are high and EBITDA in absolute terms is incomparably lower than the revenues from operating income.

Thus, petrochemical production can most commonly be considered just a part of an integrated development project, whose economy may currently be unprofitable, mainly due to high investments in deep gas processing and petrochemistry.

The object of research is characterized as:

Russia today is one of the largest producers of crude oil and petroleum products: 32 large oil refineries with a total installed capacity of 310.4 million tons per year operate in Russia. Russia takes ~ 19th place in the world in terms of petrochemical production (1% of the global volume), and 11th place in terms of per capita. In Russia, for each person working in the petrochemicals, there are from \$ 30 thousand to \$ 40 thousand of the enterprise's revenue, and among world industry leaders this figure is \$ 300 thousand - \$ 500 thousand. The total volume of primary processing of crude oil in Russia increased by 2.5% (or 7 million tons) in 2018 compared to the same period in 2017 and amounted to 286.9 million tons. However, in the last four years there has been a downward trend. It should be noted that the reduction in the number of products at the same time occurred with an increase in its quality. In 2016–2018 a positive price trend took place in the markets of all petrochemical products. Ethylene and propylene prices increased by 33 and 44%, respectively. In the aromatic segment, the maximum growth was shown by prices for benzene and styrene, increasing in 2018 compared to 2017 by 22 and 42%, respectively. However, the market situation changed at the end of 2018, when oil prices, oil products prices, and polymers prices went down sharply. The situation in the Russian oil production and refining market in 2018-2019 showed a decrease in profitability, a deterioration in the economy of Russian oil refineries forced them to look for development opportunities in the petrochemical industry. The results of the first quarter of 2019 suggest a further decrease in growth rates: the chemical production index was 1.6% compared to the same period in 2018 (versus 2.2% in 2018 and 6.7% in 2017). However, by 2020, a significant improvement in production dynamics can be expected: at the end of 2019, it is expected to launch a new petrochemical complex with a capacity of 2 million tons of polymers per year.

The main competitive advantage of Russia in the field of petrochemicals is that it has a rich raw material base, because natural resources are the basic component of petrochemical production. However, while the domestic market for petrochemical products is not saturated. Comparing the per capita consumption of petrochemicals in Russia and in the developed countries, it is significantly inferior to them. Export of Russian polymers today is less than 1%, while the volume of export of crude oil is 10%. The share of Russia in the production of ethylene is 2.6%, and in the production of plastics - 1.8%. In terms of the total volume of production of chemical products, Russia ranks twentieth.

Russia occupies quite a good position in only a few areas: in the ammonium nitrate market, the share of Russian products is 40%, urea - 17%, ammonia - 16%.

The commodity nomenclature of exports of the chemical complex of Russia is represented mainly by products of low and medium degree of technological redistribution, which is used for further redistribution into products with high added value. The main products with export potential: mineral fertilizers - 35%; synthetic rubber - 9%; ammonia - 5% (24% of production); methanol - 2% (53% of production). The physical volume of export of petrochemical products in 2018 increased by 3.5% compared to 2017.

Unlike export, the nomenclature of Russian imports is diverse, traditionally goods with high added value prevail in it. A comparison of the product structure of Russian exports and imports shows that mainly low-value chemicals are exported from the country, and high-value-added products are imported: catalysts, plasticizers about 35%, plastic products 23%, plastics and synthetic resins 19%.

At the same time, stagnating domestic consumption does not give positive signals regarding long-term development prospects. Since traditional petrochemical companies have set themselves the goal of expanding production and increasing capitalization, in order to neutralize the negative impact of the maneuver on petrochemicals, since 2022 in the Russian Federation will earn a reverse excise tax on oil with a damping component. The benefit can be given to companies investing in new production, as well as existing ones - if they invest at least 65 billion rubles in the modernization of ethane processing plants from 2021 to the end of 2026. This will allow companies to continue to regularly equalize tax conditions for different types of petrochemical feedstocks.

According to the calculations of the Ministry of Energy of the Russian Federation the reverse excise tax will attract more than 3.5 trillion rubles investments to Russia in the next 6-7 years, and increase the processing of petrochemical raw materials by 8-10 million tons.

The fact that only operating petrochemical companies are investment-attractive should also be taken into account. In modern conditions, the chemical industry of the Siberian Federal District is experiencing increased competition from Asian and Middle Eastern producers of petrochemical products.

The contribution of the petrochemical to the region's GDP is 6-7%. A feature of the Siberian chemical industry is its significant export orientation: in the total production, its share was 40% (while the district's share in the total volume of petrochemical production is 11.2%). The example of calculations for the Siberian Federal District, demonstrating the negative investment-attractiveness of petrochemical activity from scratch, is presented in Figure 5.

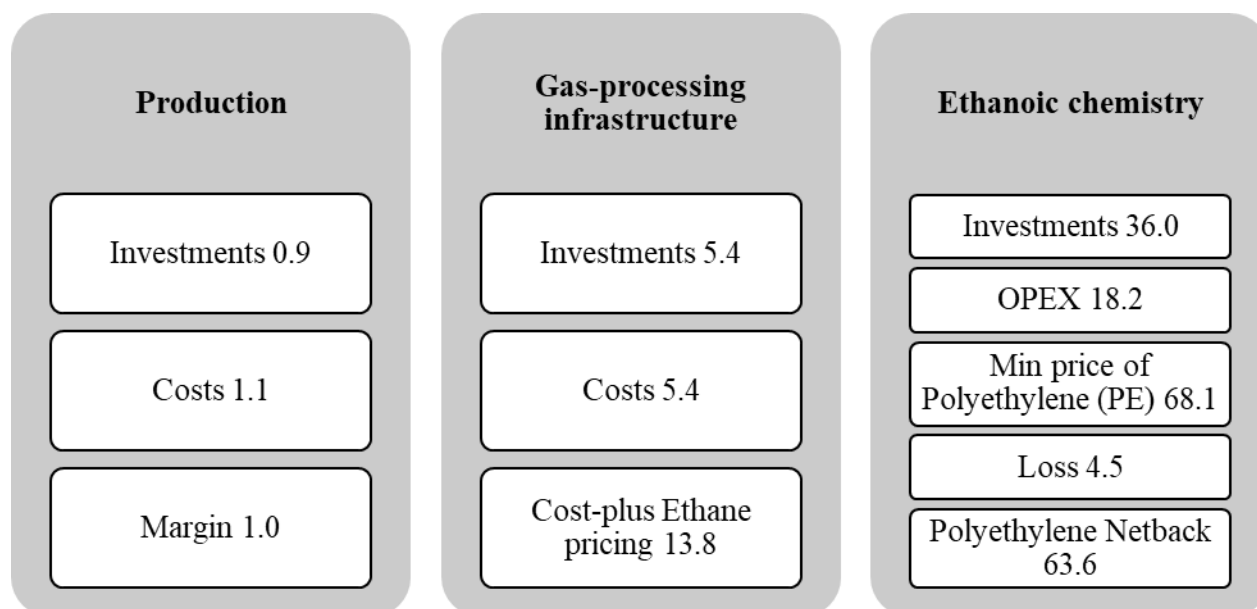


Figure 5. Economics of ethane chemistry, RUB '000 / olefins, t

The return on investment projects in the petrochemical industry of the Siberian Federal District is 6 years, while in the country this figure is about 10-12 years. This is due to the fact that petrochemical plants consist of many technological processes with high capital intensity, and a significant part of such companies is located in this part of the Russian Federation.

The existing economic situation (investments are needed in the production of semi-finished products in addition to the development of a specific production, today country's production and investment practice is based on the separation strategy of investment projects) in the country over the period analysed resulted in the need for restructuring economic policies, exploring new methods of financing and redirecting the country's economy, and for import substitution and localization of goods and services, in particular. What is more, encouraging the development of real economy became one of the important topical issues.

The sources of financing, including investments, play a major role in the implementation of any project. The modern financial mechanisms and innovative financial products hold a special position among the financial sources that companies attract in order to update the fixed assets. Moreover, they are relevant in terms of the need for the petrochemical segment organizations to adapt to the changing environment.

4. Results' analysis

The factors, adversely affecting organizations' activity in the provision of mechanisms for financing investment projects in petrochemical companies are outlined in Figure 6.

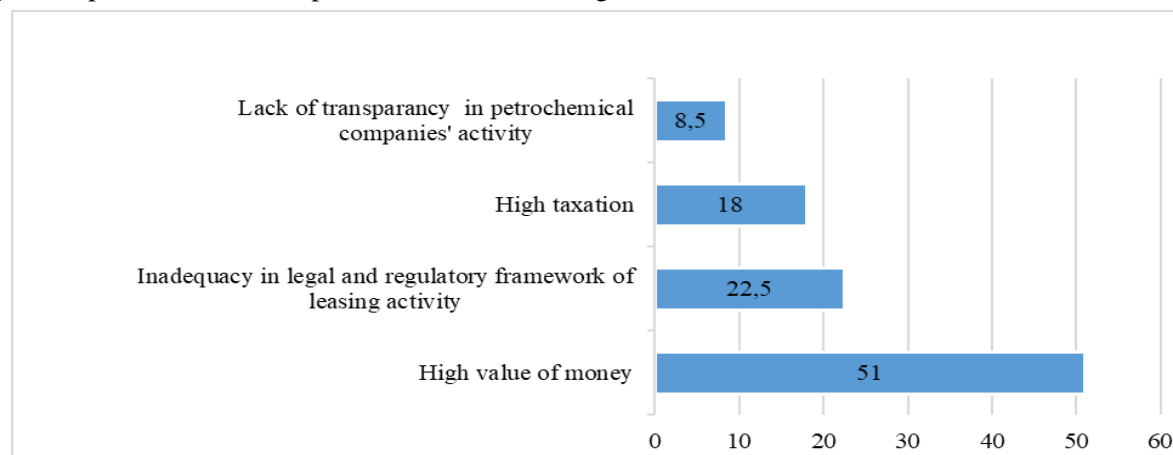


Figure 6. Limiting factors for the development of mechanisms for financing petrochemical projects

Nevertheless, petrochemistry serves a driver of hydrocarbons demand, and, as the international petrochemical industry shows, it is growing rapidly, due to the globally increased chemicalization of economy. Until 2030, the advanced countries of the world plan to maintain the pace of development in the petrochemical industry at a rate of 6.7% at least per annum (see table 1).

Table 1. Production projections for the main market segments until 2030

Indicator	2020 (planned)	2030 (planned)	Growth indicator, %
Production, by the main market segments			
Rubber, kt	33 100	37 000	112
Synthetic rubber, kt	19 100	23 200	121
Polystyrenes and polymers, kt	289	292	101
Processing petrochemical feedstock and production of the primary products, kbbl/d	93,5	95,7	102
Synthetic fiber, kt	65 000	78 000	120
Ammonia, kt	179 000	197 000	110
Nitrogen, kt	183 400	214 000	117
Carbamide, kt	182 000	218 000	120
Phosphorus acid, kt	56 700	73 000	129
Products consumption, by the main market segments			
Rubber industry, kt	31 000	35 000	113
Synthetic rubber, kt	17 700	22 000	124
Polymers, kt	6-10% per year	6-10% per year	-
Polyethylene, kt	6-8% per year	6-8% per year	-
Polypropylene, kt	3,7 – 6,9% per year	3,7 – 6,9% per year	-
Processing petrochemical feedstock and production of the primary products, kbbl/d	83,6	87,1	104
Synthetic fiber, kt	62 000	75 000	121

Source: Energeticheskij Biuletën, 2018 <http://ac.gov.ru/files/publication/a/19162.pdf>

According to the Reference Technology Scenario (RTS), the demand for basic polymers in the world is projected to grow by 40% by 2030, and by 60-65% by 2050. The countries of the Asia-Pacific region will become the centre of the growth in production and demand for petrochemical products. The production of methanol will experience the fastest growth, which by 2030 will increase by more than 50% and will almost double by 2050, as compared with 2017. The countries of the Asia-Pacific region will account for almost two-thirds of the increase in methanol production. Ammonia production will increase by 15% by 2030, and by 30% by 2050, as compared with 2017. Africa and the Middle East will demonstrate the highest production growth rates: both regions will almost double the production of ammonia by 2050. The increased ammonia production will be conditioned mainly by the growing demand for nitrogen fertilizers in developing countries (Energeticheskij Biuletën, 2018 <http://ac.gov.ru/files/publication/a/19162.pdf>).

In this context, the following largest foreign projects are worth considering (see Figure 7):

- the project on constructing and modernizing petrochemical capacity in Azerbaijan, including the petrochemical project of SOCAR GPC valued at over \$ 4 billion;
- the plans to construct new petrochemical facilities in Atyrau Region and create a single processing chain for the production of petrochemical products with high added value (Kazakhstan);
- the project for the development of the gas and chemical industry in Turkmenistan - development strategy of "Turkmengas" State Concern.

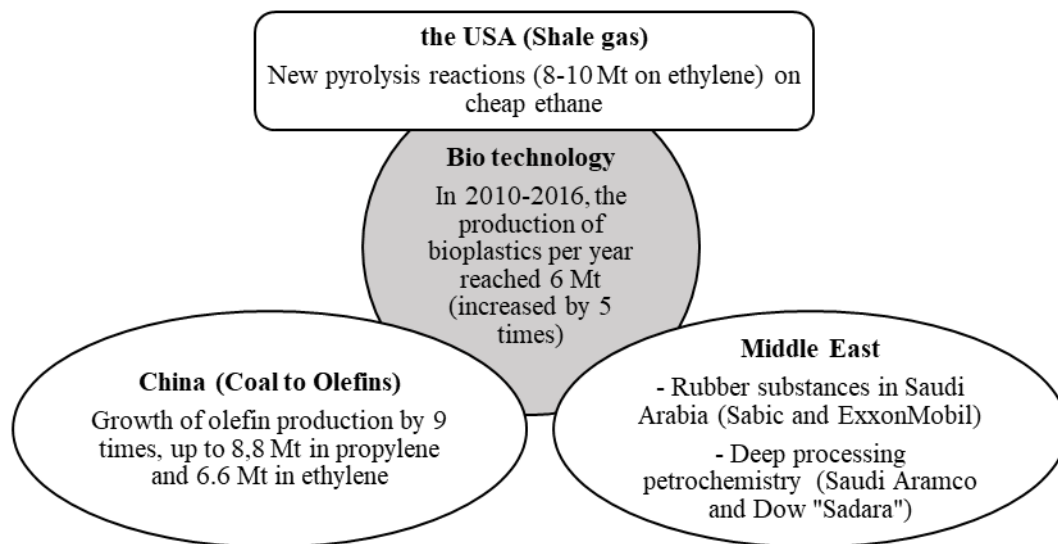


Figure 7. Competitive models of the petrochemical complexes development abroad

In recent years, the petrochemical industry in Russia has achieved some success, due to increased investment and starting up several large-scale production facilities. In 2010-2017, the production of large-capacity polymers in Russia grew by 58% and reached 5.4 million tons. The growth was ensured by investment increase in the industry and the commissioning of new large-scale industries.

The priorities in the development of the petrochemical industry in the Russian Federation until 2030, declared at the international conference "Gas and Petrochemical Industry - 2030" are worth noting.

In terms of business objectives, the petrochemical development plan for the Russian Federation implies:

- introducing modern standards for the design, construction and operation of production facilities to the whole petrochemical chain;
- programs for developing and encouraging domestic demand, industrial and domestic consumption standards and modern materials;
- supporting the development of industry support infrastructure, primarily in the field of energy, transport and engineering.

The implementation of the above-mentioned points should result in:

- a radical reduction of capital and operating costs in the industry, by 10-25% by year;
- the growth of domestic production and consumption (* 1,5 - 2 to GDP);
- import substitution in key product groups and increasing the export potential of the industry.

Among the tasks providing the implementation of the proposed priorities of the industry until 2030 are the following:

- staffing and educational and scientific support for the petrochemical industry to provide modern competence-based personnel structure and technological platform of the industry;
- information and analytical support for making the industry transparent for controllers, participants and investors;
- creating mechanisms to provide feedback from the business community, which will enable self-regulation and industry decision-making mechanisms.

Thus, prioritization of problems according to the degree of influence of the main segments of petrochemical companies on competitiveness is presented in Figure 8.

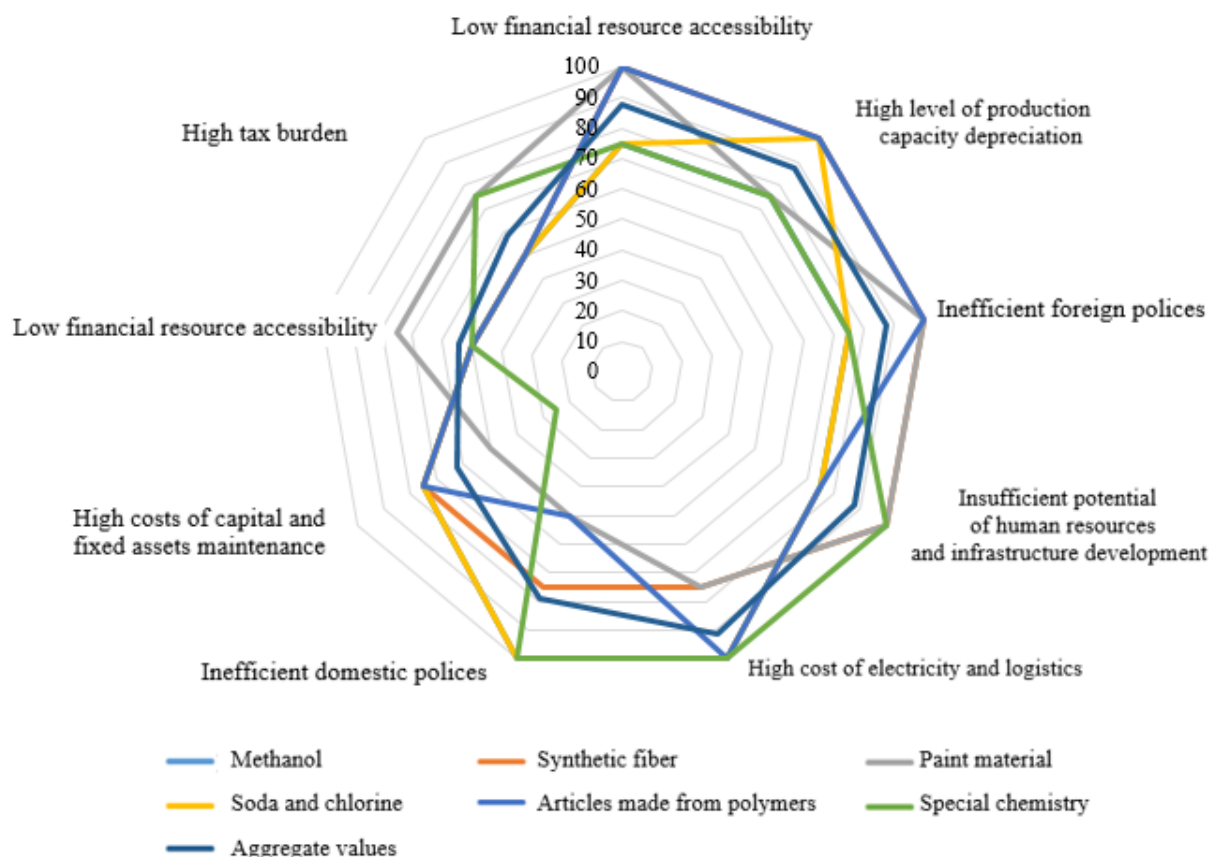


Figure 8. The degree of combined impact of individual segments of Russian petrochemical industry on the final index of competitiveness

Therefore, from this point of view, petrochemistry should be considered one of the top priority directions of Russian economy development (see Figure 9).

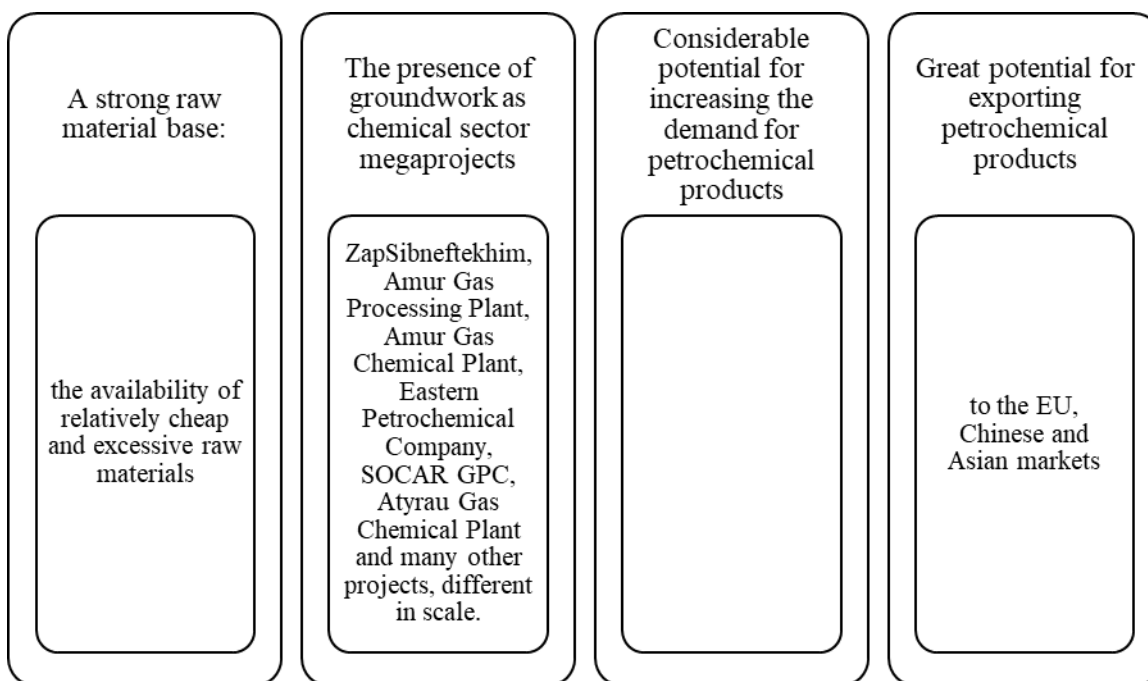


Figure 9. Favourable conditions for the development of petrochemistry investment potential

The Strategy for the development of the chemical and petrochemical complex of Russia until 2030, approved in 2016, presupposes the increased consumption of all the types of primary raw materials; naphtha and liquefied petroleum gases by 2-2,5 times, ethane – by 5 times. The growth in ethane use will primarily take place due to processing wet gas from new fields in Eastern Siberia and the Far East. By 2030, the production of large-capacity polymers will be increased up to 14,4 million tons (almost by 3 times, as compared with 2017), while their consumption will double. Thus, by 2025, due to growing production, Russia is likely to become a major exporter of large-capacity polymers (net exports will account for 6,4 million tons), primarily, polyethylene and polypropylene. The main volume of new production will be distributed between two plants - ZapSibNeftekhim and Amursky Chemical Plant, which together will ensure the production of 3 million tons of polyethylene per year. The products are going to be exported mainly to foreign markets: the European and of the countries of the Asia-Pacific region (Energeticheskij Biuleten, 2018 <http://ac.gov.ru/files/publication/a/19162.pdf>). More details on the development of competitiveness in the markets and petrochemical products are available in Figure 10.

Thus, financial organizations come to realization that this potential will be developed by all means, both at the state and corporate levels. The organizational optimization resources are limited, and manufacturers are at such a stage, when the proportion of new technologies in business is growing substantially, which will proceed in future. So, today, petrochemical companies need to decide, which technologies and solutions will provide the most profitable production and output with high added value, and which financing mechanisms will be most convenient and highly-demanded.

DEVELOPMENT OF DOMESTIC DEMAND FOR PETROCHEMICAL PRODUCTS

State	Industry/Business	Anticipated effect
<ul style="list-style-type: none"> •- Programs on stimulating domestic demand; •- Development of new standards for petrochemical products consumption (automobile industry, housing and public utilities) 	<ul style="list-style-type: none"> •- Projects of entry / market position development / sales in key growth regions; •- Creating new modern products / solutions. 	<ul style="list-style-type: none"> •- Growth in petrochemical products consumption; •- New sales markets and modern product structure.
DEVELOPMENT OF EXPORT/INTERACTION WITH INTERNATIONAL ORGANIZATIONS		
State	Industry/Business	Anticipated effect
<ul style="list-style-type: none"> •- Programs on protecting the domestic market within the WTO; •- Supporting international expansion of the projects of Russian petrochemical companies. 	<ul style="list-style-type: none"> •- Enhancing the competitiveness of the production in the Russian Federation; •- Certifying products to access international markets. 	<ul style="list-style-type: none"> •- Development of the export potential of petrochemistry of the Russian Federation; •- New international market development.

Figure 10. Competitiveness in the petrochemical markets and products

Source: the authors

In the paradigm of the new technological structure, there are some obvious project investments in petrochemical companies: the need to replace outdated equipment and to build new or reconstruct the existing oil pipelines.

Such changes create ample opportunities and prospects for the use of modern financing technologies (see Figure 11).

The factors positively affecting the development of mechanisms in financing investment projects of the existing petrochemical companies are:

- Single standard contract for each project step (project splitting)
- Incremental contractual service is well suited for the implementation of complex non-standard projects
- Low costs of work under a single standard contract
- Both non-interference and full control over the project implementation
- Low legal risk
- Minimum diversion of petrochemical company resources
- High control over the project financing.



Figure 11. Standard scheme of investment project financing and implementation in the existing petrochemical companies

Source: the authors

Conclusions

Naturally, petrochemical companies will constantly be trying to find ways to run more projects at lower cost, adjust to the changing conditions, introduce innovations and increase business continuity through the use of advanced technologies and solutions for improving the profitability of chemical production and economic efficiency of innovation activity.

Maximizing the profitability of investment projects and innovative projects, is possible due to optimization of raw materials in petrochemical production, according to the scenarios of changing the financial market situation.

Consequently, consistent with all the above, it can be said that modern financial mechanisms are one of the optimal tools for attracting supplementary funding for petrochemical companies. Bearing in mind the ever-growing business volumes, and complying with the recommendations for growth of the companies in the industry until 2030, the financial mechanisms offered by the market are most profitable, relevant, simple and convenient to apply to practice, not to mention other numerous advantages and state support.

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Tatiana BONDARENKO is the Docent, Candidate of economic science, Associate Professor at Plekhanov Russian University of Economics.

Research interests: finance and project management; innovation and strategy; investments.

ORCHID ID: <https://orcid.org/0000-0003-1009-5931>

Alex BORODIN is the Professor, Doctor of economic science at Plekhanov Russian University of Economics.

Research interests: finance and regional development; innovation and digitalization; project management; sustainability

ORCHID ID: <https://orcid.org/0000-0002-2872-1008>

Makpal ZHOLAMANOVA Professor of the Department of Finance Eurasian National University named after L.N. Gumilyov.

Research interests: finance and regional development; innovation and digitalization; project management; sustainability

ORCHID ID: <https://orcid.org/0000-0003-0942-2376>

Galina PANAEDOVA is the Professor, Doctor of economic science at North-Caucasus federal university.

Research interests: regional development; innovation and marketing; project management; tourism, world economy.

ORCHID ID: <https://orcid.org/0000-0001-8261-6308>

Tatiana BELYANCHIKOVA, PhD, associate professor, Financial University under the Government of Russian Federation.

Research interests: finance; innovation and marketing; education management; regional development.

ORCHID ID: <https://orcid.org/0000-0002-3086-1683>

Lira GURIEVA, is the Professor, Doctor of economic science at North-Ossetian State University named after K.L. Khetagurov, Vladikavkaz, Russian Federation.

Research interests: Economics and Finance, corporate Finance, innovation Economics, digital Economics, financial computing

ORCHID ID: <https://orcid.org/0000-0002-9632-539X>

Register for an ORCID ID:

<https://orcid.org/register>

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ASSESSMENT OF BARRIERS TO RENEWABLE ENERGY DEVELOPMENT USING STAKEHOLDERS APPROACH

Arash Khalili Nasr ¹, Maryam Kafizadeh Kashan ², Abbas Maleki ³, Navid Jafari ⁴, Hamid Hashemi ⁵

¹ Graduate School of Management and Economics, Sharif University of Technology, Azadi st. P.O.Box 1458889694 Tehran, Iran

^{2,3,4} Department of Energy Engineering, Sharif University of Technology, Azadi st. P.O.Box 1458889694 Tehran, Iran

⁵ School of Business, London South Bank University 103 Borough Road, London, SE1 0AA, London, United Kingdom

E-mail: ³ maleki@sharif.edu (Corresponding author)

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Abstract. Typically, the lack of effective stakeholder participation in a project—especially in the initial planning and implementation stages—has a negative impact on the expected performance of the project. These negative consequences require attempts to encourage their effective participation. Nevertheless, there are some challenges ahead, such as conflict of interest among the stakeholders. For more accurate identification of the interests, objectives, and performance of the stakeholders, this paper proposes an accurate and organized model for the analysis of results from the stakeholder impact index. We implemented the proposed model to determine the existing barriers to renewable energy development in Iran, specifically the wind and solar energy sectors. For data collection, we used the opinions of the experts and other people involved in these industries. Data analysis showed that the current implantation conditions of the solar and wind energy sectors were similar from the stakeholders' perspectives as not bad but poor. The required position of each stakeholder to lift the barriers and develop these industries was identified and their current positions from the desirable conditions were assessed. Finally, some recommendations were presented to improve the stakeholders' conditions and eliminate the barriers.

Keywords: renewable energy; stakeholder; wind, sun; development; barriers

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1. Introduction

In executing projects, an important problem is the presence of different stakeholders having diverse interests during the project makespan (Abidin, 2010). Concerning multiple stakeholders can lower risks and in return

improve short term and long term performance (Nasr et al., 2019). A large number of positive or negative interests are actually affected in different stages of a project from start to end. The representatives of these interests are known as the project stakeholders. According to a definition by Freeman (1984), a co-developer of the stakeholder theory, a stakeholder is an individual or group that can either affect or be affected by organizational goals. Stakeholders are usually concerned about the conflict of their interests in a project (Lin et al., 2017; Wallbauma et al., 2010). The interests of stakeholders emerge from a wide range of expectations and values in line with project goals (Lin et al., 2018). Since stakeholders define project success differently, they consider a project successful when they achieve their goals by partaking in that project (Davis, 2014, 2016). The participation of stakeholders must be considered the major factor in “sustainable development” plans (Liu et al., 2013; Yang et al., 2016). Therefore, the project management team should have a clear insight and accurate information regarding the participatory goals of stakeholders in projects in an effort to satisfy stakeholders in addition to sustainable progress in projects (Hwang & Tan, 2012; Pietroseoli & Monroy, 2013). Managers should codify a clear road map to the participation of stakeholders in order to achieve the predetermined project goals and satisfy a wide range of stakeholders (Healey, 1996). The identification of stakeholders is regarded widely as the first step in the analysis of stakeholders (McElroy & Mills, 2000; Cleland & Ireland, 2007; Jepsen & Eskerod, 2008). Various techniques have been proposed to evaluate the stakeholder influencing level such as the score-based approach (Mitchel et al., 1997), the power/interest matrix (Johnson, Scholes, 1999), and the circle of stakeholders (Bourne, Walker, 2008); Delphi survey (Rezk, Radwan, Salem, Sakr, Tvaronavičienė, 2019). These methods were criticized by Wang et al. (2012) for being too qualitative and abstract. It is necessary to develop a quantitative and concrete method for prioritizing the stakeholder influence (Hongyang et al., 2018). In this regard, Olander (2007) proposed a stakeholder influencing level method consisting of three sections, the first of which is based on a technique proposed by Mitchel et al. (1997) to evaluate the type of stakeholders involved in projects. Stakeholders are divided into different groups based on their characteristics, i.e. power, legitimacy, and urgency. The second section is based on a technique proposed by Bourne and Walker (2005) showing the interest/impact index (VIII). This index indicates the impact and interest levels of stakeholders in a project. This section resembles the power/interest matrix (Johnson & Scholes, 1999). In fact, the power/interest matrix helps interpret how different stakeholders affect the project implementation (Winch & Bonkeh, 2002; Newcombe, 2003; Olander & Landin, 2005). The final section of stakeholder influence index pertains to the evaluation of every stakeholder’s orientation towards a project: Are they supporters or critics? For this purpose, Olander (2007) used the approach proposed by Mills and McElroy (2000) suggesting five different levels of stakeholder orientation towards a project: active disagreement, passive disagreement, neutrality, inactive agreement, and active agreement. Every stakeholder’s orientation towards a project determines the direction that stakeholder’s influence on the project decision-making process. Olander (2007) used this method to analyze the stakeholder impact on the advances of construction projects. Moreover, Olander and Anne Landin (2007) used the same method to analyze the stakeholder impact on the railway construction project in Sweden. Other researchers benefited from this method differently. For instance, Hongyang Li et al. (2018) deleted the stakeholder orientation factor and used the Factor of Stakeholder Influencing Level (FoSIL) to analyze the stakeholder influence in the development of green buildings. Furthermore, Nhat Hong Nguyen et al. (2009) developed a stakeholder impact index method by considering proximity and stakeholder knowledge in addition to power, urgency, and legitimacy. Then they used this method to analyze the stakeholder influence on state-owned civil projects in Vietnam.

It can generally be stated that the stakeholder impact index is a method of analyzing project stakeholders from the perspectives of stakeholders. This method facilitates the process management, benefits from the positive effect of stakeholders, and mitigates any negative effects (Olander, 2007). All of the factors employed to calculate the impact index are very important in evaluating the stakeholder impact on a project; thus, they should accurately be evaluated. Table 1 shows the analysis procedure and factors used in some prominent papers. Accordingly, all of these studies lack a structured and accurate analysis of results. Since the impact index technique is a conceptual method, it needs to be developed further for the accurate analysis of results. For this purpose, a comprehensive

model was proposed in this paper for the accurate and structured analysis of results through the stakeholder impact method.

Table 1. The workflow of sample researches done with the impact index method

	Method development	Considering the roles of stakeholder interest and power in the subject	Regarding power, legitimacy, and urgency as the constituent features of attribute	Considering additional features for the calculation of attribute	Considering the role of stakeholder position in the subject	Structured analysis of calculation results
Toward a Theory of Stakeholder Identification and Salience: Defining the Principle of who and What Really Counts (Mitchell, R. K., et. al., 1997)	*	-	*	-	-	-
Quantifying stakeholder influence in decision/evaluations relating to sustainable construction in China e A Delphi approach (Li, H., et. al., 2018)	-	*	*	-	-	-
Stakeholder Impact Analysis in Construction Project Management (Olander, S., 2007)	*	*	*	-	*	-
A comparative study of factors affecting the external stakeholder management process (Olander, S., & Landin, A., 2007)	-	*	*	-	*	-
Stakeholder impact analysis of infrastructure project management in developing countries: a study of perception of project managers in state-owned engineering firms in Vietnam (Nguyen, N.H., et. al., 2009)	*	*	*	*	-	-
Stakeholder impact analysis during post-occupancy evaluation of green buildings – A Chinese context (Li, H., et. al., 2018)	*	*	*	-	-	-

Source: Collected by the authors

1.1. Case Study

Within the framework of climate changes caused by human activities and market changes, there is an ongoing energy transition across the world. The phenomenon that directs this transition is renewable energy (Mey and Diesendorf, 2018). The use of renewable energies by oil-rich countries like Iran not only contributes to reduced emission of CO₂ but also allows for more oil and gas exports through diversifying energy resources for consumption and strengthening energy security. The recognized potential for renewable energy in Iran has reached 760 MW while its special geographic location has provided high potential for solar energy. In fact, except for the coastline in South Iran, its central and southern areas are very suitable places for the installation of solar cells (Alamdari et al., 2013). According to wind energy atlas, it is estimated that approximately 18,000 MG of wind energy can be harnessed. As a result, to use the proposed model, the selected issue for the study has barriers to the development of solar and wind energy industries in Iran.

Regarding the important role of experts in the development of policies, surveys and interviews were used to collect opinions of the experts and other persons involved in these industries. Data analysis was performed with SPSS.

Section 2 presents the utilized method and research hypotheses. Section 3 presents the mechanism for the identification of stakeholders and data collection and analysis. Finally, summarization and conclusion represented.

2. Methodology

There are different methods for the determination of stakeholder management indices. One of these methods is the interest-impact index. This method was developed by Bourne and Walker (2005) to specify the stakeholders' interests in the project and their effectiveness. In this method, the interest index (V) and stakeholder effectiveness index (I) in the given project are scored on a five-point scale (1: very low, 2: low, 3: medium, 4: high, 5: very high) and the interest-impact index is calculated using Equation 1:

$$VIII = \left(\frac{V \times I}{25} \right)^{0.5} \quad (1)$$

This index can determine the weight of each stakeholder with respect to their interest and impact on the project, whereas the interest-impact index cannot show the mechanism of stakeholders' impact and their positions on the project. To address this shortcoming, it was recommended to use two indices, namely the attribute (Mitchell et al., 1997) and the position of stakeholders on the project (McElroy and Mills, 2000).

The stakeholder attribute (A) identifies three stakeholder salience, namely power (P), legitimacy (L), and urgency (U), and specifies how much each stakeholder can influence the project. To use this index, each salience is given a weight between 0 and 1 that the total weight equates to 1. Based on the experts' opinions from the questionnaire, it was determined that the salience power had the highest weight. As a result, the weight of power was 0.4 and the weights of legitimacy and urgency were 0.3. The total weight of each attribute index was obtained by calculating the total sum of saliences of each stakeholder.

The underlying reasons to select these three stakeholders were as follows. Power shows that the stakeholder can impose his will on others. Legitimacy shows the compliance of the stakeholder's will with current values and regulations. Urgency means that the given activity or subject can affect the stakeholder, or vice versa, in the short-term, and this influencing or influenced potential is important to the stakeholder. As a result, each salience can identify the extent of the stakeholder's impact.

According to the Mitchell et al.'s theory (1997), the stakeholders are divided into seven characteristic groups based on three aforementioned attributes: latent, dormant, demanding, dependent, dangerous, dominant, and definitive. Latent stakeholders are those with only one attribute.

This is because managers either do not know them at all or do nothing about them. Stakeholders possessing two attributes are regarded as demanding stakeholders. This is because they have urgent claims from authorities. The third group possesses all three attributes and the managers give them a major priority.

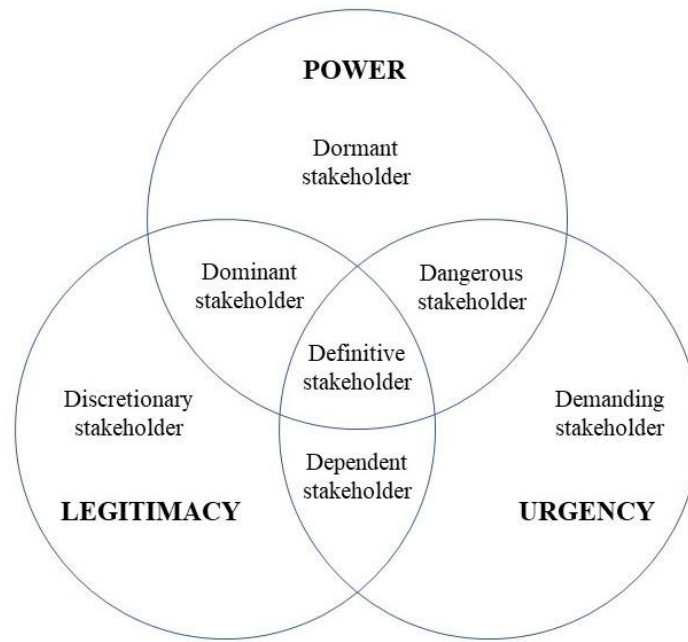


Figure 1. Stakeholder typology based on three salience attributes

Source: Mitchell et al., 1997

Determining the position of stakeholder (POS) establishes whether the stakeholder agrees or disagrees with the project and whether it actively supports its position. Accordingly, POS falls into five categories: 1=Active support, 2=passive support, 0=not committed, -0.5=passive opposition, -1=. Olander (2007) derived the stakeholder impact index from the combination of these two indices with the interest-impact index. This index is obtained from the numerical multiplication of A, interest-impact index (VIII), and POS (Equation 2).

$$VIII \times A \times POS = SII \quad (2)$$

The total position of the project is obtained from calculating the total sum of the impact index of all project stakeholders (Equation 3).

$$\sum VIII \times A \times POS = SII_{Project} \quad (3)$$

The stakeholders with positive and negative SII values have desirable and undesirable impacts on the project, respectively. Moreover, these values should not be reduced during the project's life cycle.

It can be concluded that the interest-impact index can be used to determine how much the stakeholders are interested in affecting a project and to what extent. The impact type index determines how much a stakeholder is influencing and what its impact type is. The POS index shows whether the stakeholders are interested in the project and agree with its implementation. As a result, this index eliminates uncertainties about the interests of stakeholders and their degree of impact on the interest-impact index.

After calculating these indices, two stakeholder typologies were defined for data analysis: active and passive stakeholders. The active stakeholder is the one with at least two saliences (salience \geq 06) and the interest and

impact values in the range of 25% higher than the measured range (interest and impact ≥ 4). The passive stakeholder is the one with maximum one salience (salience ≤ 0.3) and the interest and impact values in the range of 25% lower than the measured range (interest and impact ≤ 2).

Assuming that a project is desirable—in terms of feasibility and possibility of spatial development—when active stakeholders agree to it (position > 0) and passive/neutral stakeholders disagree to it (position < 0), first active and passive stakeholder should be identified by determining the position of all stakeholders. Then, ideal conditions should be found, in which the stakeholder with a positive position is active and the stakeholders with the negative and neutral positions are passive. Otherwise, each stakeholder should be directed toward desirable conditions with the application of a suitable strategy. Figure 2 presents these stages in this algorithm.

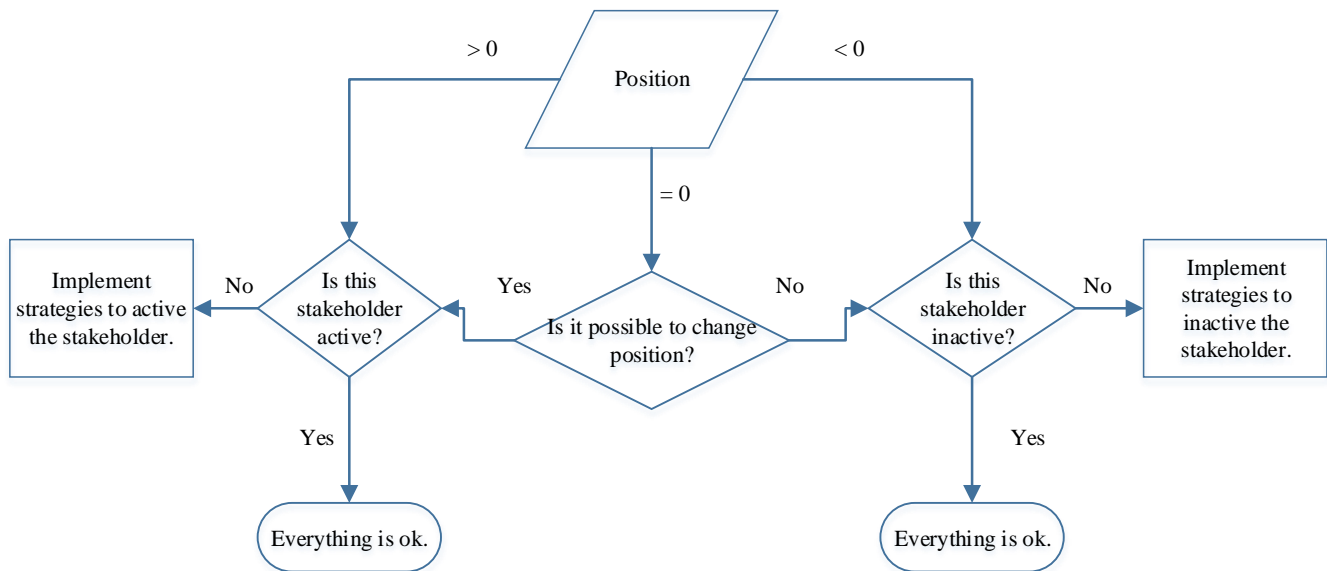


Figure 2. Data Analysis Algorithm

Source: Developed by the authors

2.1. Hypothesis

This study hypothesized that failure in achieving developmental objectives, in general, is due to the conflict of interests, objectives, and role of stakeholders. We formed following hypotheses to assess the reason for failure in the successful implementation of developmental plans in the field of renewable energy, specifically the solar and wind energy, in Iran:

H1: Stakeholders that agree with wind energy development are active stakeholders.

H2: Stakeholders that agree with solar energy development are active stakeholders.

H3: Stakeholders that disagree with wind energy development or have a neutral position on it are passive stakeholders.

H4: Stakeholders that disagree with solar energy development or have a neutral position on it are passive stakeholders.

3. Data Collection and Analysis

3.1. Stakeholders

One prerequisite for identifying stakeholders is to use a systematic procedure. To this end, the stakeholders were divided into internal and external categories. The external stakeholders are effective in the initial stages of the project (Olander and Landin, 2008); whereas, the internal stakeholders have a leading role in the project implementation stage. The internal stakeholders were identified with respect to the value chain of the industry and the external stakeholders were identified by interviewing the experts.

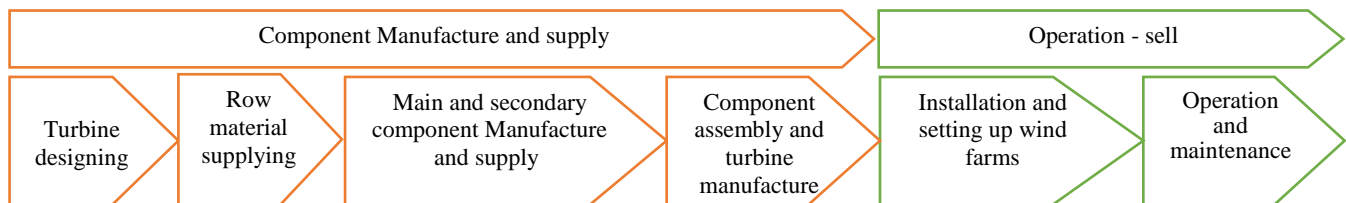


Figure 3. Value chain of wind energy industry

With respect to the value chain of the wind energy industry (Figure 3), the stakeholders in this industry are defined as follows: The turbine designer, raw material supplier, parts manufacturer, turbine assembler, transportation service provider, infrastructure and installation sector, operator, repair and maintenance sector, and investor/owner.

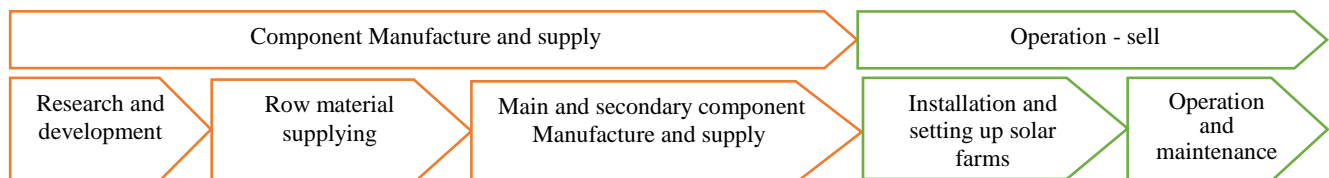


Figure 4. Value chain of solar energy industry

With respect to the value chain of the solar energy industry, the stakeholders in this industry are defined as follows: The panel designer, raw material supplier, parts manufacturer, infrastructure and installation sector, operator, repair and maintenance sector, and investor/owner.

To determine the external stakeholders, the experts were interviewed and the external stakeholders in these two industries were identified as follows: People living near the plants, final consumer, the Ministry of Energy, the Ministry of Petroleum, the Department of Environment, power producers from other renewable energy sources, Non-renewable electricity producers, SATBA (it is Renewable Energy and Energy Efficiency Organization), the Central Bank, domestic banks, the Islamic Consultative Assembly, and the Planning and Budget Organization.

3.2. Surveys and Respondents

To collect the required data, questionnaires were distributed among the experts via social networks and email. Ultimately, 21 questionnaires were completed. In total, 10 respondents held a PhD degree, eight with a master's degree, and three with a bachelor's degree or studying in an undergraduate program. Moreover, 10 respondents were academicians, nine were active in industrial fields, and two were public sector employees. To design the questionnaire, all internal stakeholders were regarded as one stakeholder, called the energy production group. Due to the multiplicity of the stakeholders, the external stakeholders were reviewed and it was decided to include some stakeholders in the questionnaire. Therefore, the external stakeholders in the questionnaire were local people, SATBA, the Ministry of Energy, Non-renewable electricity producers, the Islamic Consultative Assembly, the Planning and Budget Organization, and banks.

3.3. Calculation of Impact Index

According to the data collected following the determination of the interest-impact (Equation 1), the stakeholder impact index was obtained using Equation 2 (Table 2). The final row in this table shows the total sum of this index for each industry.

Table 2. Stakeholder impact index

stakeholders	Wind energy industry	Solar energy industry
Energy production group	0.15	0.17
SATBA	0.22	0.29
The Ministry of Energy	0.05	0.07
Non-renewable electricity producers	-0.14	-0.15
Local people	-0.01	0.02
The Islamic Consultative Assembly	0.07	-0.01
Planning and Budget Organization	-0.07	-0.10
Banks	0.03	0.01
sum	0.30	0.30

Source: Calculations done by the authors

In the stakeholder impact index, the total stakeholder impact index with negative or zero value indicates the project undesirability, whereas the total stakeholder impact index with a value in the range of 0-1 indicates the project desirability. This value is more desirable with getting closer to 1. According to the results (Table 2), the total sum of stakeholder impact indices is a positive value (0.3) for both the wind and solar energy industries, indicating the low desirability of both industries in Iran. Although the total sum of the impact index is a positive value, which is desirable, its distance from the ideal threshold value of 1 indicates a considerable distance between the current and ideal conditions. Moreover, a similar condition for the final stakeholder impact index in the wind and solar energy industries suggests that there is no difference between the perceptions of different stakeholders regarding the implementation conditions of these two industries. As a result, similar strategies and policies are required. However, some subtle differences between some stakeholders necessitate small differences in adopted strategies. To investigate the causes of the current conditions and find appropriate improvement strategies, data analysis was conducted according to the algorithm in Figure 2.

3.4. Data Analysis

Figures 5-12 present the median values of collected data for stakeholder position, interest, impact, and salience in solar and wind industries. Numbers 1-8 in the horizontal axis of the diagrams indicate the Energy production group, SATBA, the Ministry of Energy, Non-renewable electricity producers, the local people, the Islamic Consultative Assembly, the Planning and Budget Organization, and the banks.

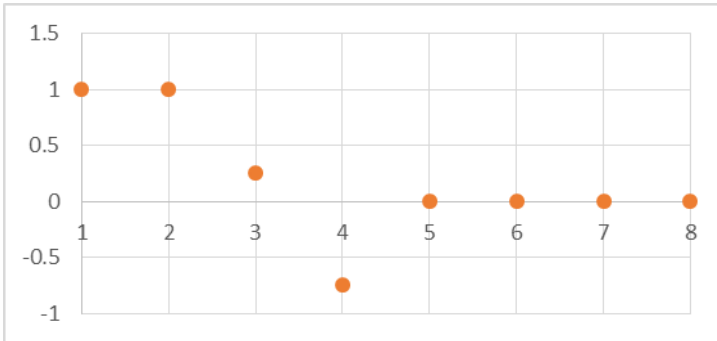


Figure 5. Median Position (solar)

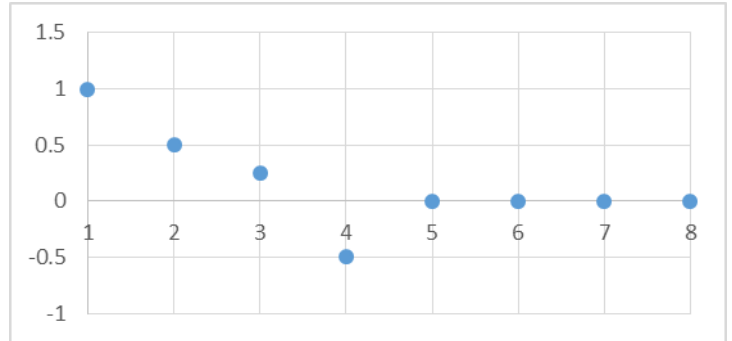


Figure 6. Median Position (wind)

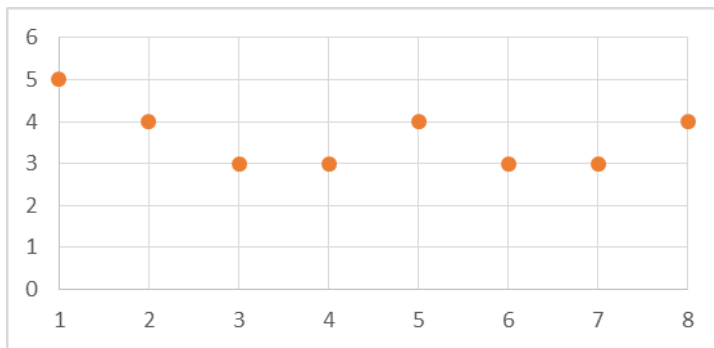


Figure 7. Median Interest (solar)

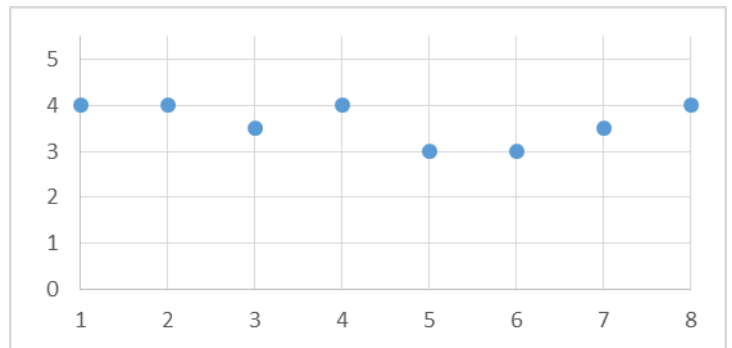


Figure 8. Median Interest (wind)

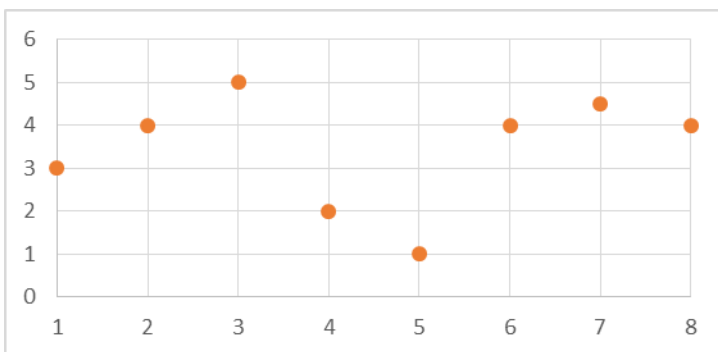


Figure 9. Median Impact (solar)

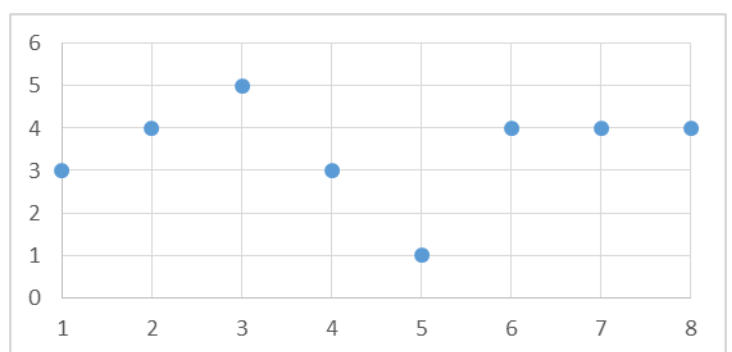


Figure 10. Median Impact (wind)

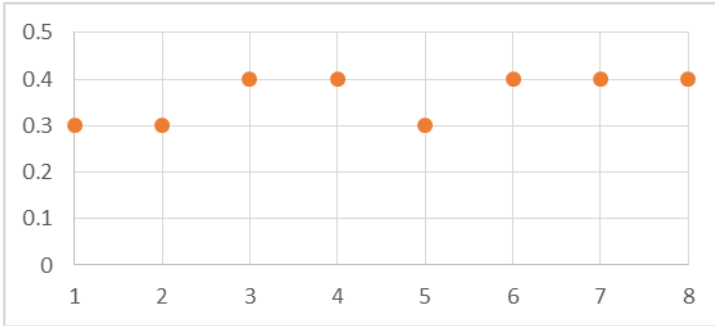


Figure 11. Median Salience (solar)

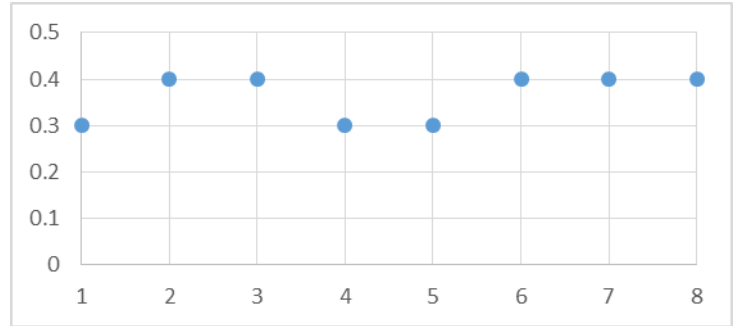


Figure 12. Median Salience (wind)

According to Figures 5 and 6, the Energy production group, SATBA, and the Ministry of Energy have positive position; whereas, the Non-renewable electricity producers have negative position and local people, the Islamic Consultative Assembly, the Planning and Budget Organization, and the banks have a neutral position. Due to the competition, the position of Non-renewable electricity producers cannot be changed. However, the neutral positions of local people, the Islamic Consultative Assembly, the Planning and Budget Organization, and the banks can be altered into a positive position by some changes. For example, the position of the Islamic Consultative Assembly can be improved by providing proper information about the development course in these industries. Moreover, in case of timely payment of power purchase agreements and greater support by SATBA and the Ministry of Energy, the banks' confidence in the commitment of power plants to their obligations enhances which, in turn, improves the bank's position towards developing these industries. Moreover, reducing bureaucratic obstructions in the wind and solar energy industries by the Planning and Budget Organization not only facilitates the development of the power production sector but also changes the indices related to this organization. In addition, reducing bureaucratic obstructions in this organization can indirectly improve the banks' position in these industries. With respect to local people, the only way to change their position in making them informed. To improve the wind and solar energy production conditions, if the neutral position of the stakeholders is turning into positive position, they should be categorized as active stakeholders, along with the Energy production group, SATBA, and the Ministry of Energy; otherwise, they should be categorized as passive stakeholders, along with the Non-renewable electricity producers.

Figures 7 and 8 show that the stakeholders' interest is in a range from moderate (3) to high (4). With respect to the Energy production group, SABTA, and the Ministry of Energy, which have positive positions, the higher level of interest is desirable. It may be even better to develop these industries to achieve ideal conditions to increase their interest. With respect to other stakeholders with a negative and neutral position with no chance of position change, a high level of interest is undesirable. Therefore, appropriate measures should be taken to reduce their interest dependence on the wind and solar energy, so as to reduce their interest in these industries.

According to Figures 9 and 10, the impacts of the stakeholders are different in both the wind and solar energy industries. The Ministry of Energy has the greatest impact, followed by SATBA, the Islamic Consultative Assembly, the Planning and Budget Organization, and the banks. The Non-renewable electricity producers are third in the order of impact with a great distance, followed by the locals with the least impact.

Figures 11 and 12 show the attributes of the stakeholders; that is, each stakeholder is given a value based on its saliences and their weights. For example, if a stakeholder possesses *power* and *legitimacy*, its value will be 0.7, and if it possesses *legitimacy* and *urgency*, its value will be 0.6. According to this diagram, the stakeholders of the wind and solar energy possess similarly relevant attributes. Meanwhile, the Energy production group and local people have less number of salience relative to other stakeholders.

The position of all stakeholders on the wind and solar energy industries should be identified based on the algorithm in Figure 2. In addition, we should show which factors in each stakeholder should be changed to improve the conditions. As was mentioned earlier, active stakeholders are those with at least two salience, and interest and impact values of higher than 4 (salience ≥ 0.6 , interest & impact ≥ 4). The passive stakeholders are those with maximum one salience and interest and impact values of lower than 2 (salience ≤ 0.3 , interest & impact ≤ 2). To estimate the distance of all factors from assumed desirable values and to establish whether these distances are significant, the Wilcoxon Signed-Ranked Test in SPSS was utilized because of data abnormality. In fact, mean data comparison cannot be used with abnormal data and the medians should be investigated. This test was developed in 1945 to compare the difference in medians.

Tables 3, 4, 5 and 6 present the results. In these tables, $p < 0.05$ shows a significant difference between the desirable factors and assumed desirable values. In addition, $p \geq 0.05$ indicates that the difference is not significant. For a better understanding of differences, the median of all factors is presented in the median observed column.

Table 3. Wind energy stakeholders with positive position

Position > 0	Wind						H1 Hypothesis 1
	Interest		Impact		Salience		
	Hypothesis interest ≥ 4		Hypothesis impact ≥ 4		Hypothesis salience ≥ 0.6		
	P value	Median observed	P value	Median observed	P value	Median observed	
Energy production group	0.254	4	0.001	3	0.000	0.3	Not supported
SATBA	0.370	4	0.500	4	0.204	0.4	supported
The Ministry of Energy	0.006	3.5	0.002	5	0.276	0.4	Not supported

Source: Calculations done by the authors

Table 4. Solar energy stakeholders with positive position

Position > 0	Solar						H2 Hypothesis 2
	Interest		Impact		Salience		
	Hypothesis interest ≥ 4		Hypothesis impact ≥ 4		Hypothesis salience ≥ 0.6		
	P value	Median observed	P value	Median observed	P value	Median observed	
Energy production group	0.185	5	0.002	3	0.000	0.3	Not supported
SATBA	0.435	4	0.233	4	0.161	0.3	supported
The Ministry of Energy	0.032	3	0.002	5	0.435	0.4	Not supported

Source: Calculations done by the authors

Table 5. Wind energy stakeholders with negative and neutral position

Position ≤ 0	Wind						H3 Hypothesis 3
	Interest		Impact		Salience		
	Hypothesis interest ≤ 2		Hypothesis impact ≤ 2		Hypothesis salience ≤ 0.3		
	P value	Median observed	P value	Median observed	P value	Median observed	
Non-renewable electricity producers	0.000	4	0.075	3	0.007	0.3	Not supported
Local people	0.006	3	0.352	1	0.158	0.3	Not supported
The Islamic Consultative Assembly	0.001	3	0.000	4	0.000	0.4	Not supported
Planning and Budget Organization	0.000	3.5	0.000	4	0.000	0.4	Not supported
Banks	0.000	4	0.000	4	0.000	0.4	Not supported

Source: Calculations done by the authors

Table 6. Solar energy stakeholders with negative and neutral position

Position ≤ 0	Solar						H4 Hypothesis 4
	Interest		Impact		Salience		
	Hypothesis interest ≤ 2		Hypothesis impact ≤ 2		Hypothesis salience ≤ 0.3		
	P value	Median observed	P value	Median observed	P value	Median observed	
Non-renewable electricity producers	0.000	3	0.147	2	0.004	0.4	Not supported
Local people	0.000	4	0.137	1	0.090	0.3	Not supported
The Islamic Consultative Assembly	0.000	3	0.000	4	0.001	0.4	Not supported
Planning and Budget Organization	0.000	3	0.000	4.5	0.000	0.4	Not supported
Banks	0.000	4	0.000	4	0.000	0.4	Not supported

Source: Calculations done by the authors

The results were similar for the wind and solar energy industries. The Energy production group, SATBA, and the Ministry of Energy should be categorized as active stakeholders because of their positive position. The Energy production group have a desirable interest, and undesirable impact and salience values. Obviously, an ideal condition refers to one at which those stakeholders with a positive position to development have high impact values and those stakeholders with negative and neutral position to development have low impact value. It is worth noting the impact value of the Energy production group with a positive position, as one of the major stakeholders supporting the development, was low and relatively similar to the impact value of Non-renewable electricity producers as the major opposition to the development of these industries. This impact is desirable for Non-renewable electricity producers; however, the lower impact of these stakeholders is desirable for achieving ideal conditions. On the other hand, this low impact value of the Energy production group is not desirable and should be increased. The impact is to some extent affected by the attribute factor that the impact value increases with increasing the attribute of stakeholders. Moreover, the impact of stakeholders reduces with reducing their salience. As a result, one way to increase the impact of the Energy production group is to increase the attribute of these stakeholders. With respect to SATBA, all factors were desirable and it was regarded as an active stakeholder. The Ministry of Energy had desirable impact and salience but required higher interest to be regarded as an active stakeholder.

Tables 5 and 6 show the stakeholders with a negative and neutral position. To achieve maximum condition improvement, these stakeholders should have a positive position first and then the required measures should be taken to activate them. If the position of a stakeholder cannot be changed, that stakeholder should be inactivated. According to Tables 5 and 6, Hypotheses 3 and 4 for all stakeholders were rejected. Non-renewable electricity producers had a low impact value; however, this impact was desirable considering their negative position. On the other hand, their interest and attribute values were high and far from desirable values for a passive stakeholder. Due to the air pollution caused by the generation of electricity from fossil fuels and global warming following CO₂ emission, we may reduce the power and legitimacy of these stakeholders by informing people and authorities. The impact and salience of the locals were low and proportional to a passive stakeholder, whereas their interest was higher than a passive stakeholder. Concerning the Islamic Consultative Assembly, the Planning and Budget Organization, and the banks, all three factors—namely impact, interest, and attribute—were higher than that for a passive stakeholder. For these stakeholders, it is more efficient to make their position positive than to reduce other factors.

Conclusions

Theoretical Contribution

The main objective of this study was to provide a theoretical method for an organized and accurate analysis of the results obtained from the stakeholder impact index. After accurately determining the stakeholders and identifying the impact, interest, position, and attribute indices, the impact index was first calculated using Equation 2. Negative or zero values for the total impact indices of all stakeholders indicated that the project is undesirable, whereas a total impact index in the range of 0–1 indicated that the project condition is desirable. This figure becomes more desirable when approaching 1. For an accurate analysis of the causes of these desirable and undesirable conditions, it was recommended to divide the stakeholders into two groups. The stakeholders with positive positions were placed in the first group and the stakeholders with negative and neutral positions—whose positions could not be changed—were placed in the second group. As increasing the total impact index requires the stakeholders with positive positions to have higher interest, impact, and attribute; and stakeholders with negative and neutral positions to have low impact, interest, and attribute; two groups of stakeholders (active vs passive) were defined. According to definitions, active stakeholders were those with the interest and impact values 25% higher than the measurement range (interest and impact ≥ 4) and at least two salience (salience ≥ 0.6). The passive stakeholders were those with the interest and impact values in a range 25% lower than the measurement range (interest and impact ≤ 2) and maximum one salience (salience ≤ 0.3). Then, in the ideal conditions assumed for each project, stakeholders in the first and second groups (position > 0 and position ≤ 0) were defined as the active and passive stakeholders, respectively. After assessing each stakeholder's condition, it was necessary to take the required measures to turn the current conditions into the desirable conditions defined for each stakeholder.

Practical Contribution

The practical part of the study used the proposed analysis method to investigate the causes of failure in renewable energy development plans, specifically the wind and solar energy sectors. To this end, these industries were analyzed using the value chain of the wind and solar energy industries and the experts and stakeholders' opinions. Finally, eight stakeholders were specified for each industry. All internal stakeholders were regarded as one stakeholder, namely the Energy production group. The other seven stakeholders were local people, SATBA, the Ministry of Energy, Non-renewable electricity producers, the Islamic Consultative Assembly, the Planning and Budget Organization, and the banks. Then, the stakeholder impact index for both industries was calculated and presented in Table 2. This table shows that despite the conditions of these industries in Iran are assessed desirable, it is required to take appropriate improvement measures. It was also found that there was no difference between the development conditions in these two industries from the stakeholders' perspective. Then, the algorithm presented in Figure 2 was used for accurate investigation of the results. The Energy production group, SATBA, and the Ministry of Energy had a positive position, Non-renewable electricity producers had a negative position, and the Islamic Consultative Assembly, the Planning and Budget Organization, and banks had a neutral position. According to research hypotheses, since stakeholders with positive position should be activated and the stakeholders with negative and neutral position should be deactivated, appropriate policies are required to achieve these goals. For example, to activate the Energy production group, such measures as value chain integration that not only increases the influence of this stakeholder but also equips them with more saliences, like power and urgency, can be effective measures. In respect to the Ministry of Energy, it is only needed to increase the interest, which can be done by changing the thoughts governing this ministry. Regarding the Islamic Consultative Assembly, the Planning and Budget Organization, and the banks, it is better to change their position and try to increase the related factors. Considering local people, due to their low impact and attribute similar to passive stakeholders, the best measure in short-term may be to reduce the interest of these stakeholders to turn them into a passive stakeholder; however, the best measure for this stakeholder is to change its position by increasing the number of indices and turning them into an active stakeholder. For example, attempts to eliminate common

misconceptions about renewable power plants and provide accurate information, such as reduced environmental impacts by means of technological advances, can improve the position of this stakeholder.

To deactivate the Non-renewable electricity producers, the interest and attribute should be reduced. For example, this stakeholder has low legitimacy; therefore, its attribute can be reduced by reducing their considerable power by attracting public attention to the pollutions produced by it.

Limitations of Study

This study had some limitations, which are recommended to be addressed in future studies. It only assessed the wind and solar energy, whereas the optimal use of energy systems requires the assessment of all renewable and non-renewable energy resources. Based on the identified priorities, appropriate policies were recommended. In addition, due to the low development of the renewable energy sector in Iran, there are still some major disagreements between the experts. Therefore, more expert opinions should be used to reduce the assessment error rate.

This study only considered external stakeholders and assumed all internal stakeholders as an integrated community. Therefore, it is recommended to assess internal stakeholders independently in future studies.

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Arash Khalili NASR is Assistant professor of strategic management at Graduate School of Management and Economics, Sharif University of Technology Tehran, Iran

ORCID ID: 0000-0001-6111-5168

Maryam KAFIZADEH KASHAN is a Master graduate of Energy Engineering at Sharif University of Technology, Tehran, Iran.

ORCID ID: 0000-0002-0999-3737

Abbas MALEKI is Associate Professor of Energy Engineering at Sharif University of Technology, Tehran, Iran.

ORCID ID: 0000-0003-2904-4587

Navid JAFARI is a Master graduate at Energy Engineering, Sharif University of Technology, Tehran, Iran.

ORCID ID: 0000-0002-4201-9549

Hamid HASHEMI is an MBA graduate from School of Business, London South Bank University, UK.

ORCID ID: 0000-0001-5587-9903

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CREDITWORTHINESS PLACE IN CREDIT THEORY AND METHODS OF ITS EVALUATION*

Aina Caplinska¹, Manuela Tvaronavičienė²

¹ *Department of Sociology and Economy, Faculty of Social Sciences, Daugavpils University, Parades Str.1, Daugavpils, LV-5401, Latvia*

² *Vilnius Gediminas Technical University, Sauletekio al. 11, Vilnius, Lithuania*

² *Institute of Humanities and Social Sciences, Daugavpils University, Parades Str. 1-421, Daugavpils, LV-5401, Latvia*

E-mails: aina.caplinska@gmail.com ; manuela.tvaronaviciene@vgtu.lt.

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Abstract. The authorss regard credit evolution in the economic thought and the notion of borrower's creditworthiness, with a special emphasis on its place in credit theory. In the process of credit theory evolution the authorss singled out three stages of theory development: 1) the naturalist theory of credit that originated within the classical political economy (A. Smith, D. Ricardo) and treated credit as a natural mechanism used by banks to redistribute the material resources in the society; 2) the capital-raising theory of credit that originated in the framework of monetarism (J. Loe, G. Mcleod, J. Shumpeter, F. Friedman, etc.) and is based on the position that credit can set in movement all production factors that are not in use in the country to create wealth and capital; 3) theory of credit regulation that originated under the impact of the depression of 1929-1933 within J. Keins'Canes' theory and justified the significance of credit regulation in economy, emphasizing that it may facilitate economic development also in the period of crisis. Along with the origin of credit theory in economic research literature in the 18th century the term 'borrower's creditworthiness' appeared that was used by A. Smith, J. Keins, N. Bunge, V. Kossinsky, etc. The analysis of definitions of borrower's creditworthiness available in research literature makes it possible for the authorss of the present study to argue that each of the suggested definitions emphasizes 1-2 aspects of creditworthiness without its systemic formulation, taking into account the borrower's ability of receiving, efficiently using, and repaying credit. Hence, the authorss suggest own updated definition of borrower's creditworthiness that is considered to be innovative

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and especially significant in the context of the borrower's long-term development. It must be noted that in the science of economics the assessment of borrower's creditworthiness is based on two methodological paradigms – creditworthiness as absence of bankruptcy and creditworthiness as an ability of efficient use of credit; the authors consider the latter to comply with the conception of a sustainable economic development, thus it must be the basis for selecting methods of assessment of borrower's creditworthiness in the contemporary practice of crediting. The authors have selected for analysis methods of assessment of borrower's creditworthiness existing in research literature and actually used – rating, prognosis, complex methods – whereof borrower's creditworthiness is calculated by multiplying the chosen indicator values with the weight of their significance in the integral indicator.

Keywords: credit; borrower's creditworthiness

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1. Introduction

Article entails the analysis of the theoretical and methodological aspects of credit and creditworthiness, the evolution of the respective theories and conceptions in the science of economics as well as comparison of various methodological approaches to the assessment of borrower's creditworthiness.

Credit has a special position in the system of economic relations; it functions as an independent economic category. Hence, both economy on the whole and individual legal and physical persons have an opportunity to meet their economic and personal needs by overcoming the limits of financial resources. Credit relations allow an enterprise on the account of additional financing to expand production, enlarge its resources as well as accelerate the achievement of the set goals. On the whole credit may facilitate the economic potential of the society.

There is no single credit theory in macroeconomics. The evolution of credit and credit relations is manifested in the development of credit theories. Taking into consideration that researchers have long ago taken up studies of credit relations, the development of credit theory took an especially significant qualitative leap in the period of developed capitalism when the role of credit and banks in economics became much more important. History proves that credit theory is transition from its essence, functions, rules of movement to the role of an instrument of economic development in the mechanism of state regulation.

According to N. Bunge, credit theory developed under the influence of two major conditions: first, under the influence of the basic ideas of the dominant economic school, second, that of the activities of the existing credit institutions. The development of credit theories was also affected by various kinds of economic crises as well as socio-economic conditions predominant in the epoch of the respective researchers' lives (Bunge, 1852).

Theoretical accounts and justifications of credit occur in research conceptions of different trends and schools. In the course of time it is possible to differentiate three main credit theories:

- the naturalist theory of credit;
- the capital-raising theory of credit;
- theory of credit regulation.

Research on credit relations reveals diverse methodological approaches to credit existing in theory and practice. This pluralism is conditioned by the peculiarities of each stage of economic system development: economic, social, and political processes in national and world economics, different methodological approaches of the representatives of various schools and trends of economic theory. To summarize, there are three theoretical approaches to credit:

- 1) credit is a negative beginning having no impact on economy; credit is a ‘great invention’ having a huge impact on economic development;
- 2) credit has a moderate role and is related only to the redistribution of resources.

These three approaches to the functional role of credit in economy testify not only to the diversity of judgement but also to the contradictions of many standpoints in each of these approaches.

Credibility affects financial security of companies (Dubauskas, 2012; Stasytytė and Aleksienė, 2015; Smrčka et al., 2016; Belás et al., 2017; Caplinska, Ohotina, 2019; Caurkubule et al., 2020; Chehabeddine, Tvaronavičienė, 2020), improvement of business environment development and of entrepreneurship (Ohotina et al., 2018; Lincényi, Čársky, 2020; Vigliarolo, 2020; El Idrissi et al., 2020; Tvaronavičienė et al., 2020).

The credit policies to be adjusted by taking into account the effects of the policy measures on the economic growth of the country and its sustainable development (Tvaronavičienė, 2014; Mentel & Brożyna, 2015; Tamulevičienė, 2016; Korauš et al., 2017.).

According to the authorss of the present research, credit initially has positive aspects and it may also have negative ones that are rather subjective than objective expressions of it, e.g. using credit inadequately to its purpose that testifies to low creditworthiness of the borrower.

2. The notion of borrower’s creditworthiness and its position in credit theory

The notion of creditworthiness (*credibility, creditworthiness, credibility*) appeared in the literature of economics in the 18th century. It was used in research works by A. Smith (Smith, 1970), J. Canes (Keyns, 1993), N. Bunge (Bunge, 1852) and V. Kossinsky (Kossinsky, 1903). In Latvian economic environment the notion of creditworthiness was introduced rather recently. After regaining independence along with the development of entrepreneurship and crediting there appeared borrower’s inability to pay the credit back to the lender and problems related to this.

Customer’s creditworthiness in the practice of world banks has been and still is one of the main objects of assessment of the usefulness and kinds of credit relations. Contemporary economists’ opinions as to the definition of the notion ‘creditworthiness’ may be split into several groups. **One of the groups** unites authorss who pay special attention to *the moral image of the customer*.

Already at the end of the 19th century N. Bunge in his work “Credit Theory” mentions the expression of the French banker J. Loe: “By expressing trust we pay attention to their (customers’) honesty – it makes us sure that we will not be deceived; their mastery – it gives us hope that they have not been mistaken in their calculations; their occupation – this lets us expect certain interest” (Bunge, 1852). Also according to E. Bregel, “the first and the most important credit condition is that the person seeking the opportunity of crediting would not seem untrustworthy as to his/her moral traits” (Bregel, 1955).

Nowadays this approach to borrower’s creditworthiness that pays special attention not only to the moral image of the customer but to that of both parties is being revitalized; this is proved by the fact that creditworthiness is more and more often defined in Western research literature by the notion of trustability. According to the research produced in the USA that focuses on the most trustworthy crediting partners in the country, the main reasons for which crediting partners trust one another are “their ability to constantly respect the strategic interests of the partner, sometimes even at the expense of one’s own short-term interests” (Peppers, 2011). The authors of the doctoral thesis considers that this approach is based first of all on the treatment of the crediting process partners as economic partners with common interests.

The second group entails those authorss who believe that creditworthiness is most closely connected with *efficiency in appropriating the borrowed assets*. According to A. Bobileva, creditworthiness of enterprise is related to its abilities of efficient use of the borrowed assets (Bobileva, 2003). Many economists support the idea that creditworthiness rests on the borrower's ability to raise enough financial means to return the loan. Hence, V. Kossinsky emphasized: "Creditworthiness is changed by the conditions that guarantee that capital will be reproduced and will not be lost" (Kossinsky, 1903).

Hence, economists belonging to this group, regarding the issue of giving credit, as the major prerequisite emphasize borrower's abilities to get income right from the credit assets that would let the borrower both repay the loan and derive profit for further development. The authors of the doctoral thesis holds that this approach is based on the paradigm of borrower's development that means that enterprise is creditworthy when it works and constantly develops, not when it just exists and has not gone bankrupt (this according to the authors is the paradigm of borrower's creditworthiness as surviving).

There is also *the third group of economists* who *identify the notion 'creditworthiness' with the notion 'paying capacity'*. Hence, A. Achkasov defines creditworthiness of the economic subject as its ability of due settlement of all fixed date payments securing a normal production process on the account of its own assets in the way that makes it possible without serious financial shocks to mobilize in the shortest time period a sufficient amount of money assets to settle all fixed liabilities in relation to different creditors (Achkasov, 1994).

According to the authors this definition equalizes the notions 'creditworthiness' and 'paying capacity'. Latvian scientist I. Kalis also defines creditworthiness of an enterprise as its ability of due settlement of its debts (Kalis, 2004).

The authors holds that the above mentioned definitions that are conditionally attributed to group three are of a single aspect. The major part of definitions are based on the main and in most cases the sole criterion that determines the level (class) of creditworthiness as the borrower's financial and economic situation that is determined according to the balance of incomes and expenditures.

The authors would also attribute the approach of International credit rating agencies to the third group of definitions of creditworthiness, as these agencies assess the borrower's creditworthiness on the basis of its ability to settle liabilities in the past and future (Black's Law Dictionary, 1990).

As concerns the main document of Basel Committee on Banking Supervision – "*International Convergence of Capital Measurement and Capital Standards*" (Basel II), it operates with the notion *default risk* that is closer to the notion of borrower's paying capacity than of creditworthiness and accentuates only the interests of bank as a participant of the process of crediting to get back credit money in due time and in total amount (Basel II, 2004).

The notion of default is based on the borrower's surviving paradigm instead of the borrower's development paradigm, closer to which is exactly the borrower's creditworthiness in the sense of the second group representatives mentioned above. In scientific literature the notion 'default' is related to the content of credit risk that is usually understood as the fact of failure of the borrower to settle its liabilities (Romanova, 2009).

Latvian scientists suggest an interpretation of borrower's creditworthiness that opposes the approach of the above described group and emphasizes that the notion of creditworthiness is often confused with the notion 'credit repayment capacity' noting that "the bank is more interested in the customer's capacity to pay the credit back" (Zelgalve, Petrovska, 2004). This approach was further developed in the work by R. Rupeika-Apoga and E. Zelgalve (Rupeika-Apoga, Zelgalve, 2009).

The theoretical analysis of the notion ‘creditworthiness’ must be carried out on the basis of system approach taking into consideration the complexity of this notion and the presence of numerous different aspects (Heylighen, 1992; Hitchins, 2003). Attempts to *provide a complex theoretical account for the notion ‘creditworthiness’* unites economists in **group four**.

The important notion of capacity is regarded in the definition provided by G. Kirisyuk and V. Lyahovsky: “The essence of the category ‘creditworthiness’ is the borrower’s actual judicial and financial and economic situation, on the basis of the assessment whereof the bank makes the decision about starting (developing) or terminating credit relations with the borrower” (Kirisyuk, Lyahovski, 1999).

Interpreting the borrower’s creditworthiness within a complex approach, a whole of certain factors is usually taken into consideration, including the borrower’s legal capacity and capacity for the execution of credit transaction; its moral image and reputation; the presence of guarantee; the borrower’s ability to make profit in general and especially from the credit assets.

This diversity of definitions of creditworthiness is accountable for by first ad foremost the evolution of this notion, and it reflects different stages of it.

Retrospective analysis of the notion of creditworthiness leads to the conclusion that this economic category is very closely connected with the culture of crediting on the whole that, in turn, reflects the level of the development of the market on which creditor and borrower work.

Therefore, according to the authors, the evolution of the notion ‘creditworthiness’ takes place mostly under the impact of the economic environment of the functioning of the parties of credit relations, i.e. it depends on national market economy development and integration in the world market.

The authors hold that the reason for difference in definitions is that they in fact reflect different stages of the financial market functioning from the period of formation to the contemporary state of development.

In the figure below the authors try to systematize the above considered conceptions of borrower’s creditworthiness taking into consideration the aspect of the prerequisites and conditions of their origin.

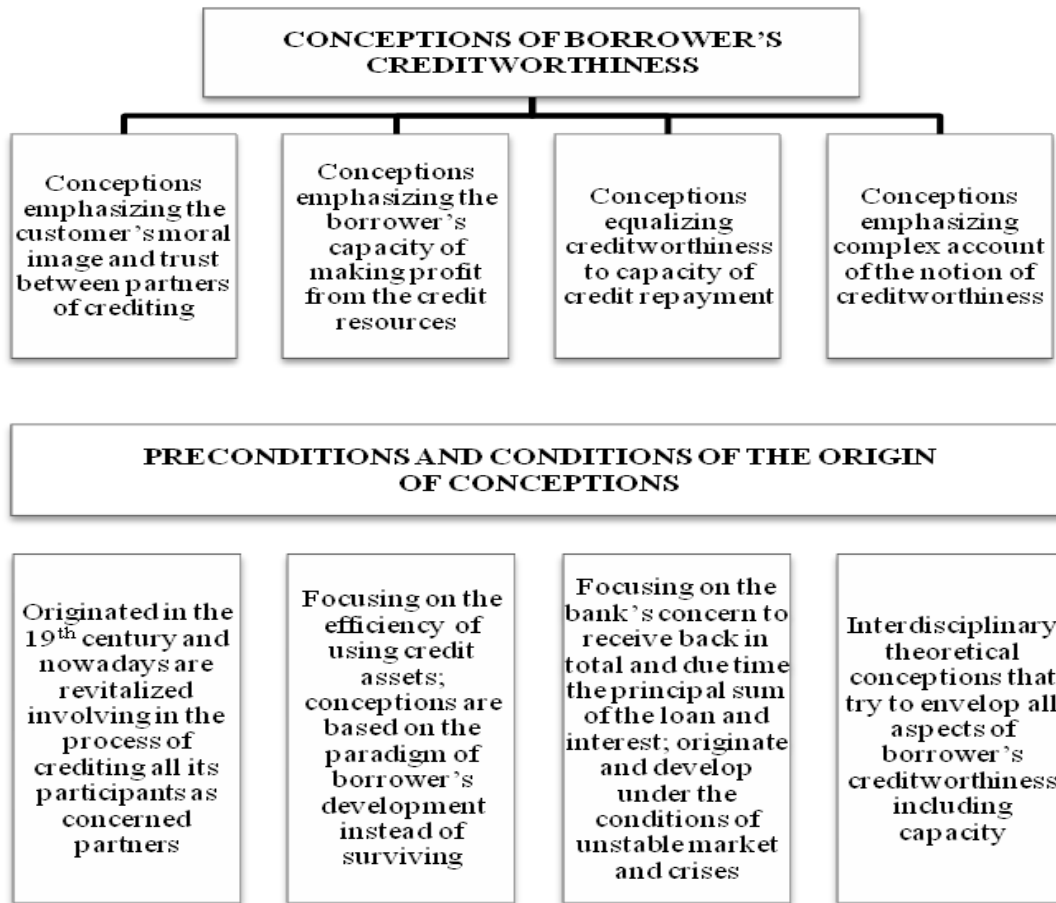


Figure Error! No text of specified style in document.. Conceptions of borrower's creditworthiness, preconditions and conditions of their origin

Source: figure produced by the authorss.

Proceeding from the results of the research produced, the authors of the doctoral thesis suggests the following **definition of borrower's creditworthiness** that complies with the contemporary situation: *it is borrower's judicial and financial capacity to attract credit assets as well as willingness and ability under the conditions of uncertainty and specific branch, regional, and individual peculiarities to pay back the received credit (with interest) in the time specified in the agreement with the precondition that all will be paid back from the added value of the credit money.* This definition reflects the manifold (complex) character of the aspects of the notion 'creditworthiness' and entails the following:

- the financial state of the potential borrower and the existence of adequate credit guarantee;
- reputation of the enterprise management;
- belonging of enterprise to a particular sector;
- the economic and political state of the borrower's enterprise;
- the enterprise capacity of efficient work in order to get added value from credit assets.

3. Methods of the assessment of borrower's creditworthiness

Methods of assessing borrower's creditworthiness may be classified according to the distribution of the applied approaches in two groups: approaches that are based on classification models and those based on the complex analysis of the borrower (see figure 2).

Classification models provide an opportunity to divide borrowers into classes, models of prognosis differentiate them depending on the probability of bankruptcy, rating models differentiate borrowers into classes depending on the category determined by means of the calculable financial coefficient and the significance level attributed to them. The balance of enterprise is topical for the elaboration of the assessment model of any borrower's creditworthiness as they all are based on the balance data. Nowadays credit rating is a popular notion widely used in assessing borrower's creditworthiness. Credit rating is assessment or rating elaborated by credit management companies or rating agencies that denotes a certain stage of enterprise's creditworthiness, and this stage usually expresses the maximum credit limit of the partner of transaction. Basel Committee on Banking Supervision recommends using a standardized approach for setting rating or an approach based on internal rating system. In the case of standardized approach, rating is determined by external organizations, e.g. international rating agencies – Standard&Poor's, Fitch IBCA, Moody's Investors Service. Internal rating system based approach is worked out in banks.

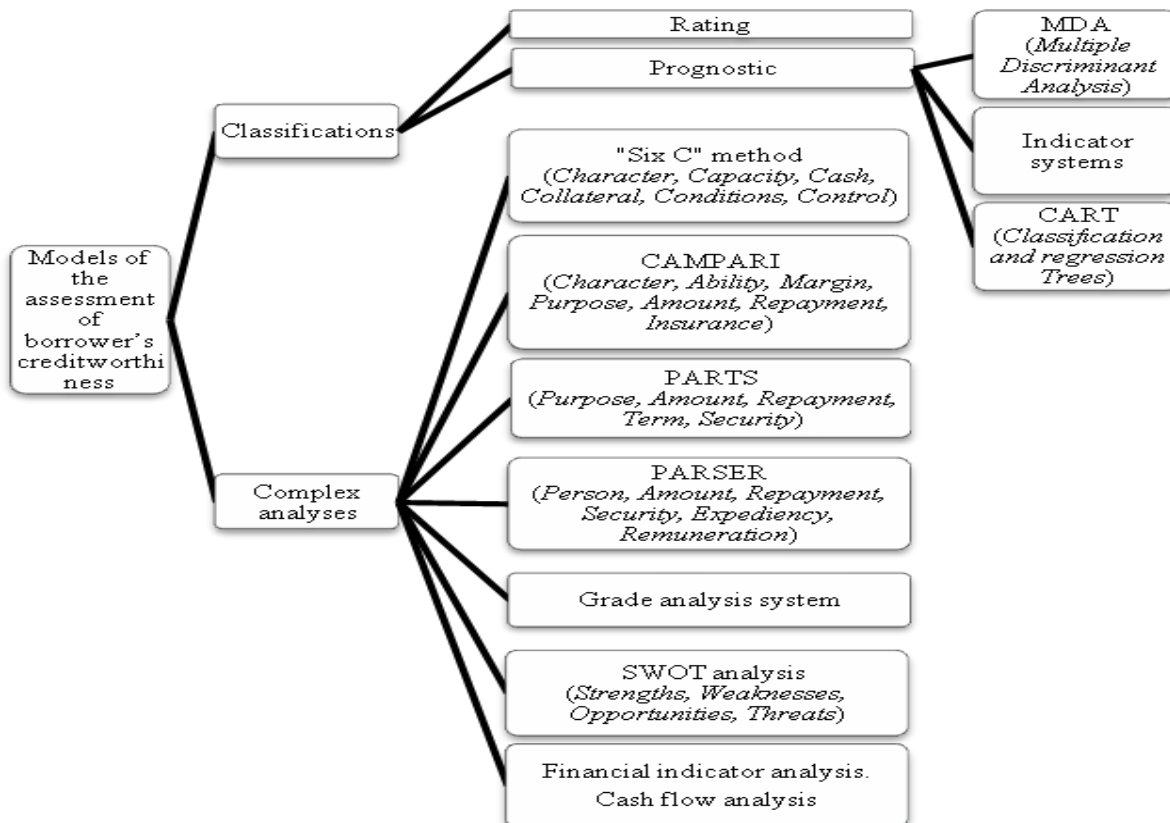


Figure 2. Classification of the models of assessment of borrowers' creditworthiness

Source: figure produced by the authorss

Credit scoring is a modification of rating assessment; it is a technical means suggested in the 1940s by the US scientist D. Durand for choosing borrowers in accordance with consumer credit (Durand, 1941). Credit scoring differs by using in the formula of rating assessment partial point assessment of indicator instead of its value. The use of this method, according to the authors of the present research, requires taking into consideration several problems:

1. necessity to carefully select financial indicators (indicators characterizing different spheres of the borrower's functioning, to provide more complete account of its state);
2. importance of justifying the border value of indicators (in this country it is rather complicated to carry out such an approach as there is a lack of information on the actual state and levels of these indicators in Latvian economy);
3. necessity to justify coefficients of significance for each group of indicators according to the sphere of action of the particular borrower;
4. locating the deviations in border spheres, thus classifying borrowers in different groups;
5. producing rating assessment, the levels of indicators are taken into account only in relation to optimal values that correspond to certain set normatives, yet the degree of their execution or failure of execution is not considered;
6. financial coefficients reflect the state of matters in the past based on the data of remnants;
7. the estimated coefficients reflect only separate spheres of action;
8. in the system of estimated coefficients, numerous factors are ignored, e.g. the borrower's reputation, perspectives, peculiarities of market condition, perspectives of the produced and to be sold products and capital investment.

Models of prognoses based on statistical methods are used for the assessment of potential borrowers' creditworthiness. Financial analytics have always tried to predict the bankruptcy of an enterprise on the basis of the values of numeral coefficients or some kind of other collected indicators. The understanding of the notion 'bankruptcy' is especially important because in works by many economists models of the so-called bankruptcy prognosis occur. Depending on the source of information, the notion of bankruptcy has a twofold meaning. In one case it is used as a synonym for the notion 'insolvency' while in other it is the solution of the situation of insolvency.

W. Beaver in the 1960s for the first time systematized coefficients reflecting with a certain probability the possibility of enterprise bankruptcy (Beaver, 1966, 1968). The dynamic of these coefficients testified to the features of bankruptcy of an enterprise. Proceeding from the analysis of the tendency of change of financial indicators and using the critical value scale, the enterprise under analysis could be classified within a certain group of risk.

The multiple discriminant analysis makes use of the discriminant function that takes into account some parameters (regression coefficients) and factors characterizing the financial state of the borrower (including financial coefficients). Regression coefficients are estimated by producing statistical data processing of companies that have either gone bankrupt or survived in a particular period of time. If the -assessment is closer to the indicator of an average bankrupt company, then, on condition that its state continues deteriorating, it will go bankrupt. If company managers and the bank make effort to eradicate the financial problems, it will probably not go bankrupt. Thus, -assessment is a signal warning of the possible bankruptcy of the enterprise. The use of this model needs rather representative sampling of enterprises across diverse spheres and sizes. It is made more complicated by the fact that it is not always possible to find a sufficient number of enterprises having gone bankrupt in a certain sphere in order to calculate the regression coefficient.

The most widespread is the model by E. Altman including the following indicators: correlation of asset turnover and the sum of assets, reinvestable profit and the sum of assets, stock market value and the borrower capital, profit from selling and the sum of assets, gross profit (profit before interest and tax deduction) and the sum of assets. Classifying an enterprise in a particular group of safety is produced on the basis of -index values of E. Altman's model.

Taking into consideration that Altman's model was elaborated on the basis of the data of the USA enterprises in the period from 1946 to 1965 (Altman, 1971), its identical use in an economy of another country is rather limited. Therefore researchers in other countries produced new models adjusting them to the economies of their countries, e.g. Chesser's model (Chesser, 1974), R. Taffler's and H. Tisshaw's model (Taffler, 1984; Taffler, Tisshaw, 1977), Springate's four factor model (Springate, 1978), Fedotova's two factor model (Fedotova, 1995), and Saifulin's and Kadykov's five factor model (Saifulin, Kadikov, 2003).

Latvian researcher R. Zhuka's (Žuka, 2005) work shows that Altman's models cannot be mechanically transferred and used under the conditions of Latvian market, while the researcher of the University of Latvia, R. Shneidere proved that Altman's formula holds true only with the enterprises of some spheres in Latvia (Šneidere, 2009). A model of creditworthiness matching Latvian conditions was worked out by a group of scientists of Riga Technical University. According to them, this model ignores peculiarities of spheres and the model of prognosis of the probability of bankruptcy is elaborated on the basis of a small sampling of enterprises.

The model *CART (Classification and Regression Trees)* (Sinki, 1994) may be used for classifying credits. It is a non-parametrical model the main advantages whereof are the opportunity of wide application, simplicity of understanding and calculating it, though it is formed by complex statistical methods. In a 'classification tree' borrowers are placed on a certain 'branch' depending on the values of the selected coefficients; next there are smaller offshoots from each branch depending on the further indicated coefficients. Precision of classification by using this model equals approximately 90%.

However, the use of mathematical models prevents taking into consideration the impact of quality factors when banks give credits. These models let bank credit experts just partially make a conclusion of the possibility of giving credit. Deficiencies of classification models are their closure on quantitative factors, free choice of the quantitative indicator system, high sensitivity to the initial improbability of data, and heaviness in the use of inter-branch and branch statistical data. Within the complex analysis models it is possible to join the quantitative and qualitative characteristics of the borrower. For instance, in the banking practice of the USA the 'six C' rule is used based on the use of six major principles of crediting denoted by the words beginning with C – *Character, Capacity, Cash, Collateral, Conditions, Control* (Altman et al, 1998).

The essence of the analysis of the borrower's creditworthiness according to the principles of crediting of CAMPARI method is sequential singling out the main factors determining the customer's action from the application for credit and the financial documents enclosed with it, assessing them more particularly after meeting the customer in person. The name of the method CAMPARI is formed from the first letters of the following words: *Character* – customer's reputation and characteristics, *Ability* – of credit repayment, *Margin* – profitability, *Purpose* of the credit, *Amount* of the credit, *Repayment* terms, *Insurance* against the risk of credit repayment failure.

In British banks the key word conveying the demands for giving credit is PARTS: P (*Purpose*) – of the credit, A (*Amount*) – justification of the credit sum, R (*Repayment*) – possibility of repayment, T (*Term*) – of credit, S (*Security*) – of credit repayment, or PARSE: P (*Person*) – customer's characteristics, reputation, A (*Amount*) – justification of the credit sum, R (*Repayment*) – possibility of repayment, S (*Security*) – assessment of credit guarantee, E (*Expediency*) – credit expediency, R (*Remuneration*) – recompense to the bank (the rate of interest) for the risk of giving credit (Hollander, 1979).

Along with the above stated methods, SWOT analysis can be used to locate the strengths and weaknesses, opportunities and threats of the enterprise or the financed project. SWOT analysis is used for the assessment of the advantages and problems of the enterprise's internal and external factors:

- strengths – the enterprise characteristics that may help attain the set goal;
- weaknesses – the characteristics that may impede reaching the set goal;
- opportunities – the external factors that may help attain the set goal;
- threats – the external factors that may impede reaching the set goal.

Complex methods for the assessment of borrowers' creditworthiness are used by many commercial banks, yet they are not polished well enough and make a poor use of mathematical apparatus. The main drawbacks of the methods of the assessment of borrowers' creditworthiness nowadays, according to the authors of the present research, are as follows:

- subjectivity – rather often the decisions taken by credit specialists are based on their intuition and personal experience;
- rigidity and instability – the assessment quality is an incidental entity that cannot be improved or made worse and it depends on the expert's opinion and preferences;
- lack of a system of instruction, knowledge exchange, and requalification – before becoming a highly qualified professional, knowledge must be accumulated by way of gaining sufficient experience in the sphere;
- a limited number of the regarded credit applications depending on the available human physical resources.

Conclusions

A group of economists who identify the notion of creditworthiness with the notion of solvency or capacity of credit repayment. Another group of economists are united by attempts at providing a complex theoretical account of the The notion of borrower's creditworthiness originated and developed within credit theory that provided different interpretations of credit and its role in economy – starting with naturalist formulations of credit that are insignificant for economic development up to the present-day interpretation emphasizing the regulating role of credit in economy.

Economists provide diverse definitions of the notion of creditworthiness and their opinions fall in several groups. One group entails authorss paying special attention to the moral image of the borrower and mutual trust of bank and borrower. Another group unites authorss who consider that creditworthiness is most closely related to the efficiency of uptaking the appropriations. There is also notion 'creditworthiness'. This diversity of definitions may be explained mainly by the evolution of this notion and reflects several stages of its formation. The analysis of the notion of creditworthiness shows that this economic category is very closely related to the culture of crediting in general that in turn is the reflection of the development level of the market where creditor and borrower work together. Therefore, according to the authors, the evolution of the notion 'creditworthiness' happens mainly in economic environments of the functioning of creditors and borrowers.

In the research literature on economy there are rather many definitions of borrower's creditworthiness, yet the authors considers that almost all of these definitions lack the element of systematic approach that would regard this notion from all aspects: capacity of credit attracting, capacity of due repayment of credit, as well as that of efficient use of credit resources.

On the basis of the research produced by the authors, her formulation of borrower's creditworthiness at the contemporary stage of credit relations is as follows: it is borrower's judicial and financial capacity to attract credit assets as well as willingness and ability under the conditions of uncertainty and specific branch, regional, and

individual peculiarities to pay back the received credit (with interest) in the time specified in the agreement making profit also for one's development from the credit resources.

Methods of the assessment of borrower's creditworthiness are manifold, yet they are mainly based on multiplying the value of certain financial indicators by the weight of their indicator significance in the resulting indicator. This resulting indicator depends on the character of the method: that is the borrower's credit rating when using rating methods, the probability of borrower's bankruptcy in methods of prognosis, and borrower's creditworthiness assessment in complex methods.

Studying the borrower's creditworthiness, the authors came to the conclusion that, though it characterizes borrower, in the actual situation is basically urgent for lender-banks; however, successful and long-term mutually profitable credit relations between an enterprise and a bank are grounded on the precondition that borrower's creditworthiness should become the focus of both the bank and the enterprise. This would mean in practice that, in the process of assessment of borrower's creditworthiness and creation of bank credit portfolio, the enterprise and the bank must be cooperation partners with common interests, instead of being opponents in the field of crediting.

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Aina CAPLINSKA Dr.oec., She is a docent at the Department of Sociology and Economics at Daugavpils University, Latvia. Her research interests are finance and credit, banking.

ORCID ID: <https://orcid.org/0000-0003-3099-7641>

Manuela TVARONAVIČIENĖ is professor at Vilnius Gediminas Technical University of Lithuania. She is national head of European Union's Horizon 2020 research and innovation programme European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme Marie Skłodowska-Curie Research and Innovation Staff Exchanges ES H2020-MSCA-RISE-2014 CLUSDEV MED (2015-2019) Grant Agreement Number 645730730. ORCID ID: <https://orcid.org/0000-0002-9667-3730>

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RESEARCH OF MOTIVATION OF EMPLOYEES IN THE IT SECTOR IN BULGARIA *

Kiril Anguelov ¹, Tsvetana Stoyanova ², Rima Tamošiūnienė ³

¹ Technical university of Sofia, French Faculty of Electrical Engineering, Kliment Ohridsky blv St 8, Sofia, Bulgaria

² University of National and World Economy, Faculty of Management and Administration, Studentski grad, Sofia, Bulgaria

³ Vilnius Gediminas Technical University, Business Management Faculty, Sauletekio ave. 11, Vilnius, Lithuania

E-mails: ¹ ang@tu-sofia.bg ; ² tsvetana_stoyanova@unwe.bg ; ³ rima.tamosiuniene@vgtu.lt

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Abstract. The motivation of professionals is not based solely on good monetary remuneration. Nowadays, every experienced IT professional is interested first and foremost in a healthy work environment in a company and then on the pay level. The employer's assessment takes into account the level of stress, work-life balance, career development prerequisites, as well as the offered social benefits - supplementary health insurance, sports cards, food vouchers, drinks and fruit at work, events with colleagues outside the office, places for creative relaxation at work. Anything that helps the creative workflow because IT professionals, are creators in the field who work and need special conditions to grow their potential and deliver good results. The article explores and analyzes the motivation factors leading to the employees' commitment of the IT companies in Bulgaria. Basic theoretical points of view are presented and the work of leading researchers in this field is being commented. A methodology has been developed and the summarized results are presented, on the two hypotheses that the authors set, namely: There is a link between Employee Compensation, working conditions, personal development opportunities and the psychological climate, and employee engagement and that Employee Compensation has exhausted the possibilities to be the only factor to guarantee the commitment of the employees in the IT industry. The results show that companies can not ignore any of the identified key motivational factors without losing employees and/or productivity/efficiency.

Keywords: stress; employees; job satisfaction; employee engagement; talent management; personnel; working conditions

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1. Introduction

Currently, company management theory focuses on various interrelated approaches to achieve and maintain their competitiveness, namely:

- effective marketing guaranteeing successful interaction with the market and sales at good prices and in the required quantities;
- an innovative system capable of responding to all the emerging needs;
- a highly productive production and logistics system for goods/services aimed at minimizing cost/expenses as much as possible;
- financial and resource security of the activity of the company;
- highly-effective and efficient human capital management of the company.

Human capital is closely linked to the achievement of all the goals that companies put for themselves. In this regard, the major efforts of any company wishing to achieve economic prosperity are related to the highly effective and efficient management of human capital, which includes:

- high quality selection of employees;
- system for training, qualification and re-qualification of employees;
- ensuring the working conditions necessary for performing the working process;
- motivating employees and ensuring their loyalty to the company.

Of course, a successful motivation system requires both an effective training qualification and re-qualification system for the employees, as well as ensuring the working conditions necessary for performing the working process; In addition, however, companies must provide motivational payroll systems and various other measures that bring the employee to the satisfaction of his work. It is necessary for the person to feel valued at each of the hierarchical levels in the company, at each position occupied in it. The paths for successful motivation of employees depend on a number of factors that have different influences depending on the type of company, the industry, the general economic situation in the region, cultural characteristics, etc. Effective motivation is therefore related to the study of the laws, principles and rules that differentiate rational human behavior and influence the full use of its labor potential. In this regard, it is necessary to emphasize that the company employee is characterized by individual behavioral traits, qualifications, knowledge, skills and cultural features. This is also the reason why the successful forms of motivation in one company applied in another do not lead to the desired degree of commitment of the employees to the fulfillment of its goals. The low degree of commitment, despite the motivational efforts made, does not allow the companies to take advantage of a decisive competitive advantage in three important directions: higher performance; higher consciousness and quality of work and lower turnover. The concept of employee engagement is built on the above considerations. In the context of ever-increasing competition from companies, on the same terms, to achieve resources and opportunities to create goods and services, successful motivation leading to employees' engagement is one of the strongest opportunities to realize a competitive advantage. Undoubtedly this fact is connected with the introduction of the problems related to the link between motivation and engagement of the employees both in the scientific researches and in business. Under these conditions, the need to carry out empirical research to establish employee engagement in specific business conditions, and in this connection to provide concrete solutions for specific industries and / or regions becomes, grows by the day. These are the preconditions, under which the object, subject, and purpose of this article are defined.

The main objective of the survey is to establish the level of commitment of the employees in the IT sector in the region of Sofia, following the example of leading IT companies. The IT sector is among the fastest-growing in Bulgaria with high value added. The consequence of this is the size of the investments made, as well as the working conditions offered. Those employed in this branch are mostly young specialists who have an interest and knowledge in the field of technology and the market of information resources. Because of the offer of quality skills and knowledge by such specialists, to keep them requires extraordinary efforts and an individual approach.

Although the development of the sector is at national level, it is significantly stronger in the capital Sofia, where the main investments are concentrated. In Sofia is also the biggest shortage of IT specialists. This poses with much higher strength the question of the level of remuneration, motivation and commitment than in other regions of Bulgaria. The general research argument is that Employee Compensation in this sector has exhausted its role as a sole motivator, and other motivators that can be identified in the survey should be used to ensure employee engagement with company goals.

2. Literature Review

2.1. Evolution of the theoretical postulates about employee engagement

The concept of employee engagement is relatively new in human resource management and has only emerged in literature since the last decade of the last century (Bagyo, 2014). Until now, there is no single and general definition of the term employee engagement. Although different researchers define engagement differently, there are some common elements inherent in each of them. These elements are employees' satisfaction with their work and pride of their employer, the extent to which people have fun and believe in what they are working on, and the understanding that their employer appreciates the contribution of each one of them (e.g. Schouten, 2019; Bernardi, 2019; Thandabhani, 2020). Thus, Robinson, Perryman and Hayday (2002) defines engagement as "a positive attitude of employees towards the organization and its values. According to him, the employee is familiar with the business context and works with his colleagues to improve his performance in order to prosper the business. For its part, the organization works with the idea to develop and breed engagement, which predetermines the two-way relationship between employee and employer".

Michael Bradley Shuck and Karen K. Wollard (Schuck, & Wollard, 2013) claim that engagement is the employees' willingness and capability to help for the success of the company by making constant efforts to do so. In their opinion, engagement is influenced by many factors both emotional and rational related to work and experience. Gallup defines employee engagement as commitment and enthusiasm for work, as well as positive emotional attachment and dedication by the employees. In addition to that, Fernandez (Tripathi and Sharma, 2016) describes the difference between the well-known thesis in the management of job satisfaction and engagement, claiming that employee satisfaction is not the same concept as engagement, as managers can not rely on employees' satisfaction to keep the most capable of them. In this case, employee engagement becomes an essential criterion. According to the Corporate Leadership Council, engagement is the extent to which employees are devoted to something or someone in their organization, how hard they work, and how long they stay as a result of their devotion (Vance, 2006).

For The Insights Group Ltd employees' commitment is their emotional commitment to their organization and the actions they take to achieve overall success. Such employees demonstrate concern, enthusiasm and focus on results (Insights Group, 2014).

A summary of all the above, we can do with the following Figure 1:

Conceptual framework of employees' engagement

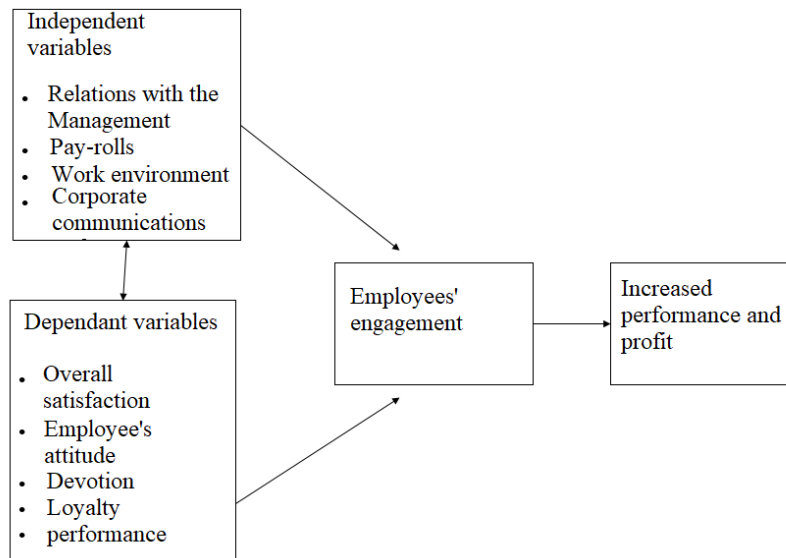


Figure 1. A conceptual framework of employee engagement

Source: <https://www.shrm.org/hr-today/trends-and-forecasting/special-reports-and-expert-views/Documents/Employee-Engagement-Commitment.pdf> p.16; the figure was supplemented by the authors

The figure shows that engagement is related to the emotional characteristics of the relationship between the company and the employees and directly affects their business results (Audit Advice Associates, 2015). Engaged employees make real efforts and enthusiasm to achieve their personal and general business goals, are concerned about the development and wellbeing of the company. At the same time, they tend to a lesser extent to changing jobs and seeking their individual development in another organization. On the contrary, they recognize the business objectives, the vision and the mission of the company and find the place of their individual goals in them. As a result, they are much more productive, more loyal and would always recommend their company as a good place to work.

2.2. State of the IT Sector in Bulgaria and more particularly in Sofia

The IT sector is developing extremely dynamically in Bulgaria. Although the leaders in the European Union remain (European Communities, EVROSTAT, 2019). Britain, Germany, France, followed closely by Italy and Spain, this sector has been growing more and more successfully in Bulgaria. According to the Bulgarian Association of Software Companies (BASCOS), the annual revenue from 2012 to 2018 has risen from 619 to 1502 million euros, with growth of between 15 and 29 percent in each year (BASCOS, 2019a). In this respect, the share of GDP in the sector is growing from 1.5% to 2.8% with a forecast in 2020 to reach 3% of the GDP if Bulgaria. Correspondingly, the industry covers more than 30000 employees, with statistics on employee growth increasing by between 10% and 22% on an annual basis. For the year 2018, 2855 new IT specialists were employed. This is more than the average per capita of IT specialists for the EU. One of the main obstacles for the growth, which most of the IT companies highlight, is the scarcity of enough IT specialists they can hire.

Under these circumstances, it is interesting to track the Employee Compensation, which average is 3 times higher than the country average; and the grow for 2018 is 5%. In this respect, it is interesting to trace a comparison between the Employee Compensation in Bulgaria and the EU leaders in the sector - the United Kingdom and Germany. At an average annual employee of an IT company operating in Bulgaria, it is 45962 BGN, bringing Purchasing Power Parity (PPP) conversion factor 49066 GBP and 50838EUR. In comparison, the average Employee Compensation for software engineer in the UK is 34653 GBP, and in Germany 50556 EUR

(BASCOM, 2019a, 2019b). The data provided is sufficiently indicative, and can draw the following main conclusions:

- despite the constant growth in the IT sector in Bulgaria there is a significant shortage of qualified IT specialists;
- the main business benefits of the sector are not rooted in low labor remuneration, which goes beyond the leading countries of the sector in the European Union;
- Bulgaria's main competitive advantages are both the good information connectivity and the traditions that exist, the good common conditions for the of IT business performance and, last but not least, the high quality (as performance and meeting the deadlines) of the IT companies operating in Bulgaria;
- Employee Compensation has exhausted its role as the only motivator. Its promotion of 5% or more per year is perceived as normal and can not serve as employee engagement with companies. What is more, in the conditions of a lack of skillful qualified specialists, it is extremely unrealistic to expect not engaged personnel to be detained in the companies - there will be someone to offer a higher salary;
- the very good reliance on the necessary motivators and their application, while guaranteeing Employee Compensation within the framework offered by competing companies, can provide the necessary commitment and dedication to the work of IT specialists.

Here it is necessary to point out another specificity of the IT sector, apart from the above mentioned high qualification of the personnel and respectively their deficiency. This peculiarity is related to the IT business processes themselves. Employees work in teams, but very often an employee is responsible completing a certain piece of the software. His sudden leave, as a result of accepting a better, according to him, offer from a competing firm, may seriously delay the implementation of a software project (finding a replacement, the time for his deputy to get acquainted with what has been done so far, the time for achieving effective teamwork). This is another reason why software companies in Bulgaria have reason to apply the principles of employee engagement to their business.

The stated wage values are average for the country. The main part of this business is concentrated in Sofia. Despite there, the IT sector is develops in several large cities (Plovdiv, Varna, Veliko Tarnovo, Rousse, etc.) but with a business scope and an Employee Compensation level unmatched by that in Sofia. This is one of the reasons for selecting the subject of the study.

On the other hand, in Sofia IT companies can be classified according to several criteria:

- according to the major investment: Bulgarian companies and companies with foreign capital representations in Bulgaria;
- according to the final products: companies developing their own products or those providing services to other companies (creation of custom software, maintenance of software systems and / or customer communications, etc.);
- according to the size: small companies with several IT specialists who, if they have a good business strategy, can grow into big companies leading in the sector.

There are small and leading companies from both the first and the second classification attributes. Typical for small companies is their higher flexibility towards the environment, but also the smaller resources available and dedicated departments for the management and development of human capital. In this article, it is chosen to establish the state of engagement among the leading companies in the IT sector in Sofia. Small companies, given that they are successfully developing in the current competitive environment, obviously also have a successful practice to ensure employee engagement. They will be analyzed in the next study of the authors.

This study is also topical in view of the expectation of more than 80% of the companies represented at BASCOM to increase by 10%, 25% or directly 50% of the employees (BASCOS, 2019a).

3. Methodology of the study

The research is based on the collection and analysis of quantitative and qualitative data obtained from the interviews of employees in IT companies in Sofia. The questionnaire was sent (employees were invited to participate in survey) to 150 employees in Bulgarian and foreign IT companies operating in the capital. Anonymity when completing the questionnaire is guaranteed in order to obtain honest answers. The questionnaire is designed to identify:

1. Employee's level of engagement;
2. The effectiveness of the motivation factors leading to this engagement;
3. Potential opportunities to increase engagement.

In this connection, the following two research hypotheses are put forward:

H1: There is a link between Employee Compensation, working conditions, personal development opportunities and psychological climate, and employee engagement.

There is a link between Employee Compensation, working conditions, personal development opportunities and the psychological climate, and employee engagement

H2: Employee Compensation has exhausted the ability to be the only factor to ensure employee engagement in the IT industry.

The latter hypothesis is provoked by the previous research findings, where the strong need of Training of employees in High-technological Enterprises, is identified as a motivation factor (Mihova, 2018).

Taking into account the specificity of the IT industry on one hand and the research objectives on the other, the developed questionnaire which further develops the questions by Kenexa, an IBM company (Kenexa, 2013). The Kenexa questionnaire was also used in other scholars' researches (Wiley, 2010). The following 4 questions are basic in the Kenexa questionnaire, and they are also used in this study:

1. I am proud to work for this company.
2. Overall, I am extremely satisfied with this company as a place to work.
3. I would gladly recommend this company as a great place to work.
4. I rarely think about looking for a new job with another company.

The questionnaire has been made in three parts:

1. Respondent statistical information: Sex; Age; How long do you work for your company?; How many years have you worked in the Information and Communication Industry? Is your company a Bulgarian or a foreign one? As discussed above, this study focuses on engagement with leading companies, so respondents are not being asked about the size of the organization they work for.

2. Closed questions with a predefined, most often a seven-tiered answer scale:

- 2.1. I'm proud to work in this Company;
- 2.2. My efforts in the company have been well appreciated through Employee Compensation
- 2.3. The company has provided good working conditions, which gives me the opportunity to apply creativity to my work;
- 2.4. The good relationships in the company make me feel part of the company and perceive its company culture as my own.
- 2.5. I feel motivated to the maximum in the team I work in
- 2.6. I think there is an opportunity to improve my achievements if I change the team I work with
- 2.7. I feel the company's commitment to my personal and professional development through the trainings and opportunities for new positions that I am offered;
- 2.8. I feel that the best way to continue my professional development is in my current company;
- 2.9. The company has achieved a good work/life balance that motivates me to contribute the maximum of my abilities into my work.
- 2.10. Workplace security (from dismissal/redundancy) is very important to me and makes me engage with the company.

2.11. Please rank by importance the factors that are important to you: Employee Compensation, working conditions, relationships and communication within the company; training and opportunity for new positions; work/life balance; Workplace security.

2.12. Would I work harder for the company if Employee Compensation rises, but the other factors get worse?

2.13. Overall, I am extremely satisfied with this company as a place to work.

2.14. I would gladly recommend this company as a great place to work.

2.15. I rarely think about looking for a new job with another company.

2.16. I feel connected to the company because of the overall capabilities that it provides me as a professional and person.

3. Open questions to identify missing factors of influence

3.1. What motivates me most to work in my company is ...

3.2. The hardest demotivation for me in my work can be...

3.3. What do you think would engage you with the company and is currently missing ...

4. Summarized survey results and comments

4.1. Statistical data and distribution of respondents

The distribution of respondents by: sex; age; period of work in the company and in the IT sector, and the type of company with regard to local/foreign origin is summarized in Table 1.

The balance between men and women is very good among the respondents (which is a common feature for the IT sector in Bulgaria) - respectively 55% and 45%. The main respondents who have filled in the questionnaire fall into the groups from the age of 22 to 45. This is also the actual situation regarding the age structure of the employees in the IT sector in Bulgaria. Interesting is the grouping of employees according to work experience in the company and years in the IT sector.

Grouping according to work experience in the IT sector is done for the following reasons: trainees in the sector (up to 1 year) - 17%; entering the sector (1 to 3 years) - 45%; settled in the sector (3 to 7 years) - 27%; Developing in the sector (7 to 12 years) - 9%; IT industry experts (over 12 years) - 2%. For each of these groups, the average level of professional rankings, job positions, requirements towards the IT company are different. It is interesting to follow the overlapping with the work experience in the respondent's current company: up to 1 year (34%), from 1 to 5 years (59%), from 5 to 12 years (6%) and over 12 years (1%). Almost no employees have spent their entire work experience in only one IT company.

On the other hand, it is a bad attestation for the involvement of IT specialists when a multiple change of employers has taken place. Employer change at the beginning of the career may be due to objective reasons not related to the motivation factors of the company: the beginning of an IT career is very often related to the search for technology and business culture with which IT professionals can achieve the highest performance. The majority of the respondents (78%) are from foreign companies operating in Bulgaria and more specifically in Sofia; only 22% of respondents work in companies with Bulgarian capital. This is typical for the large IT companies in Bulgaria. The comparison can show the impact of the imported by the parent company culture in Bulgaria.

Table 1. Statistical data and distribution of respondents

Criteria	Allocation					
Gender	Male			Female		
	55%			45%		
Age	Up to 23	23 – 30	30 – 35	35-40	40-45	Over 45 year
	23%	36%	17%	14%	8%	2%
Work experience in the company	Up to 1 year	From 1 to 5 years		From 5 to 12 years		Over 12 years
	34%	59%		6%		1%
Work experience in the IT sector	Up to 1	From 1 to 3 years	From 3 to 7 years	From 7 to 12 years		Over 12 year
	17%	45%	29%	9%		2%
Type of company	Bulgarian			Foreign		
	22%			78%		

4.2. Closed questions with predefined answers

This is the essence of the survey, with the statistically processed average values given in Table 2. The majority of questions have a predefined scale of 1 to 7, where 1 is the lowest possible and 7 is the highest. The results of questions that have no score-defining value, but indicate the respondents' opinion on the ranking of motivational factors are given in Table 3.

The first main conclusion is the high degree of commitment of the respondents to the companies they work in manifested through their pride in working with the company (score 6.4), with extremely satisfied with this company (score 6.1), with that they will recommend this company as a great place to work (score 6.2) and that they rarely think about looking for a new job with another company (6.5).

These results are complemented by the satisfaction by the Employee Compensation (which can never be fully met and, respectively, lower than the previous questions), a score of 5.9. Obviously, the respondents are satisfied with the working conditions that allow them to work in a creative environment (score 6.4) and the good micro climate they are very keen on (6.3). A fairly large proportion of them feel good about the team they work in (5.9). The latter two questions are largely inversely proportional to the next one - the ability to work better in another team (score 5.1). What is typical for this question is that high values were mostly given by employees with low work experience or those who have recently come to the company.

As in other studies (Mihova, Anguelov and Ferdov, 2018), the high importance of the training and qualification of the staff is demonstrated as an opportunity to increase their engagement - a score of 6.7. This motivation factor was presented relatively equally among all groups of respondents in the extract. The next question is controlling the previous one and, accordingly, has a similar value (score 6.5), given that the respondents feel the company's commitment to professional and personal development is perfectly normal to want to continue their professional development there.

Respondents are particularly sensitive to preserving work/life balance (score 6.6), indicating that this indicator should also be in the companies focus. In relation to that, it is a common answer of the hypothetical opportunity for the employee to sacrifice some of his privileges or conditions of work with the compensation of a higher salary (score 4.3). Higher values for this question are generally provided by younger and less experienced employees. With the older and more experienced employees in the companies and/or the IT industry, this option is not a leading one.

Relatively low is the assessment of workplace security (score 3.2). This is due not to the underestimation of the permanent workplace and to the security related to it, but due to the shortage of IT specialists and respectively the perceived feeling that a job can be quickly found in a company of the similar activity under the same or better conditions than before. The feeling is also associated with the assumption that companies are struggling to hire and retain an IT specialist rather than vice versa.

As a result of everything discussed above, respondents feel connected to the company because of the wide range of opportunities they provide as professionals and individuals (score 6.1). In this relation, interesting is the degree of importance of the factors that motivate the respondents (Table 2).

Table 2. Closed questions with predefined answers

Question	Average arithmetic value 1 min - 7 max
I am proud to work for this company	6.4
My efforts in the company have been well appreciated through Employee Compensation	5.9
The company has provided good working conditions, which gives me the opportunity to apply creativity to my work;	6.4
The good relationships in the company make me feel part of it and perceive its company culture as my own.	6.3
I feel motivated to the maximum in the team I work in	5.9
I think there is an opportunity to improve my achievements if I change the team I work with	5.1
I feel the company's commitment to my personal and professional development through the trainings and opportunities for new positions that I am offered;	6.7
I feel that the best way to continue my professional development is in my current company;	6.5
The company has achieved a good work/life balance that motivates me to contribute the maximum of my abilities into my work.	6.6
Workplace security (from dismissal/redundancy) is very important to me and makes me engage with the company.	3.2
Would I work harder for the company if Employee Compensation rises, but the other factors get worse.	4.3
Overall, I am extremely satisfied with this company as a place to work.	6.1
I would gladly recommend this company as a great place to work.	6.2
I rarely think about looking for a new job with another company.	6.5
I feel connected to the company because of the overall capabilities that it provides me as a professional and person.	6.1

The following main conclusions stand out:

1. Undoubtedly the most important is Employee Compensation. 54% of respondents point to it on first place, and 19% on second.
 2. The lowest impact on respondents is job security, the reason for which was already commented. Workplace security is taken for granted in this sector of the economy.
 3. Significant influence of motivation is offered by the opportunities of development through "trainings and opportunity of new positions". This applies both to employees with an IT service experience of up to 5 years (the most prominent) and to more experienced employees. A total of 33% puts it at the forefront of importance. The remainder of the respondents determined it by a level of importance comparable to "working conditions", "relationships and communication within the company" and "work/life balance".
 4. The other 3 factors collect similar scores. This confirms the conclusions from the questions discussed above. Companies not only can't afford to bet on just one factor and to neglect the others, but they cannot ignore any of the significant ones without at the same time reducing employee engagement.
 5. The "work/life balance" factor has the lowest impact on employees who have been 5 years or less in the IT sector. Its influence significantly grows among the IT specialists with a significant experience.
- With the comments questions, both research hypotheses are unequivocally confirmed.

Table 3. Ranking of respondents' motivational factors

Factor	Please rank accordingly the following factors:					
	Respondents percentage who placed the factor at:					
	1 place	2 place	3 place	4 place	5 place	6 place
Employee Compensation	54%	19%	12%	9%	6%	0
working conditions	4%	22%	26%	21%	18%	9%
relationships and communication within the company	4%	24%	24%	22%	16%	10%
training and opportunity for new job positions	33%	20%	18%	12%	9%	8%
work/life balance	3%	12%	17%	26%	29%	13%
Workplace security	2%	3%	3%	10%	22%	60%

4.3. Comment on the results of open questions to identify missing influential factors

Respondents have indicated as the strongest motivation to work in their companies different factors related to working conditions, relationships and communication within the company, training and opportunity for new positions and preserved work/life balance. Almost no one mentions Employee Compensation. This is natural because respondents, on the one hand, want to emphasize that they do not only work for money, but on the other they know that their salary is guaranteed with another employer, too. Indeed, the responses also indicate that there are no other relevant factors influencing motivation.

Women are generally saying that what can best demotivate them are relationships and communication within the company, and the men - Employee Compensation and work/life balance. Here are the other factors that, if absent, are a significant obstacle to building/retaining employees engagement.

Respondents sometimes give non-trivial answers (original answers) to the last question, such as: kindergarten or elementary school, different sports tournaments between colleagues in the company and other companies, etc.

Conclusions

The present study proves the fundamental role of a group of factors for shaping the commitment of the employees in IT companies in Bulgaria. Two hypotheses have been proven: There is a link between Employee Compensation, working conditions, personal development opportunities and the psychological climate, and employee engagement and that Employee Compensation has exhausted the possibilities to be the only factor to guarantee the commitment of the employees in the IT industry. The results obtained show that companies cannot ignore any of the key motivating factors (Employee Compensation, working conditions, relationships and communication in the company, training and opportunity for new positions, and the preserved work/life balance and workplace security) without losing employees and/or productivity/efficiency. Further research is needed to specify each of the factors in subgroups of respondents, as well as to start a study in the efforts of the small and medium IT companies to establish a common model of the engagement of the employees in the IT economy in Bulgaria.

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Kiril ANGUELOV is the Professor of IT Management and Dean of French Faculty of Electrical Engineering at Technical university of Sofia, Bulgaria. Research interests: IT Management; Reengineering; Industrial management and engineering; EU funds management. In these areas, he is recognized as a national expert by consulting both public authorities and private companies.

ORCID ID: <https://orcid.org/0000-0001-7936-3290>

Tsvetana STOYANOVA is the Assoc. Prof. Dr. of Department of Management, University of National and World economy – Sofia, Bulgaria. Tsvetana has more than 70 publications and in the fields of Strategic Management, Human Resource Management and Leadership. Tsvetana has a broad experience in consulting many public and private businesses.

ORCID ID: <https://orcid.org/0000-0003-3745-4551>

Rima TAMOŠIŪNIENĖ is the Professor of Financial Engineering Department at Business Management Faculty, Vilnius Gediminas Technical University, Lithuania. Research interests: e-business projects and models, investment evaluation and management, risk management, sustainability.

ORCID ID: <https://orcid.org/0000-0001-8667-3713>

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