THE LATEST TRANSITION OF MANUFACTURING AGRICULTURAL PRODUCTION AS A RESULT OF A UNIQUE GENERATION OF HUMAN CAPITAL IN NEW ECONOMIC CONDITIONS

Inna Kuznetsova [1]*, Hilary Okagbue [2], Alla Plisova [3], Elena Noeva [4], Mariya Mikhailova [5], Galina Meshkova [6]

[1] *Novosibirsk State Agrarian University, Dobroljubov street, 160, 630039, Novosibirsk, Russia*
[2] *Covenant University, Km 10, Idiroko Road, Canaaland, 112233, Ota, Nigeria*
[3] *MIREA - Russian Technological University (RTU MIREA), Vernadsky Prospekt, 78, 119454, Moscow, Russia*
[4] *North-Eastern Federal University named after M.K. Ammosov (NEFU), Belinskogo Street, 58, 677000, Yakutsk, Russia*
[5] *Sechenov First Moscow State Medical University, Trubetskaya street, 8-2, 119991, Moscow, Russia*
[6] *Bauman Moscow State Technical University, 2nd Baumanskaya street, 5, p. 1, 105005, Moscow, Russia*

E-mails:[1]* finka31081988@list.ru (Corresponding author)

Abstract. This paper studies problems in human capital formation at the present stage of World economic development. The authors conduct a correlation and regression analysis of the dependence of financial indicators of agricultural organizations and enterprises with workers' qualifications. The results suggest that the qualifications of workers significantly affect the financial stability of agricultural enterprises, and that state authorities and businesses often fail to place sufficient emphasis on improving the qualification level of employees. The study shows that the degree of acceleration of human capital of employees affects cost efficiency, net profit, gross revenue, and other resulting indicators. The following methods were used in the research: monographic, statistical-economic, and correlation and regression analysis.

Keywords: human capital; resulting indicator; cost efficiency; net profit; revenue; profitability

1. Introduction

Agriculture is a strategic sector of the economy, and its successful functioning ensures the solution of an important national economic problem, food security for the entire country. Therefore, it is crucial to determine the most important factors on which the level of development of agriculture for the present and future depend. According to classical political economics, the fundamental factors of production are natural resources, capital, labor, and entrepreneurial ability (Bykanova and Akhmadeev, 2019). The concept of human capital has been one of the most debated over the past century in the economic, psychological and philosophical fields, and in scientific and popular science literature (Mullakhmetov et al., 2018; Sharafutdinov et al., 2017; Dmitrieva et al., 2017; Latyshev, 2015; Klochko et al., 2016; Bernardi, 2019, Laužikas, Miliūtė, 2020). The consideration of the essence, structure, and specific features of human capital, the potential of its state and development, as well as the possibilities of its improvement require the identification of such factors or indicators and a logical justification that would ensure their validity for analysis. However, the complexity and multifaceted nature of the concepts under study sometimes make it impossible to identify even the limits of such a study. The purpose of this paper is to analyze the uses of labor resources and study their impacts on production indicators. Given the organizational positive outcomes of human resource development (HRD) practices like organizational effectiveness, sustainable competitive advantage, and organizational commitment, the current study was designed to detect the impact of HRD practices (employee training, employee empowerment, employee promotion) as independent variables on employee engagement and employee performance as dependent variables and to notify those who are interested. A quantitative descriptive-analytical method was adopted for the current research paper (Rumman, 2020; Gapsalamov et al., 2020; Voronkova et al., 2020). Social capital expresses the social relationship between people in an organization. A good relationship between employers and employees can enhance commitment and productivity. It also makes a positive contribution to organizational performance. Universities and other higher education institutions are the main entities that create, innovate and develop social capital in a country (Gladilina et al., 2018; Kazmina et al., 2020; Rahman, 2018; Rahman and Bobkova, 2017; Girdzijauskaite et al., 2019). The development of social capital effectively allows higher education institutions to advance the economic, social and political development of a country. Institutions of higher learning in Ghana should innovate and develop human resources via social capital for the sake of the country's socioeconomic advancement. Innovation in organizations is more likely to happen if social relations are taken into due account (Akpey-Mensah, 2020; Akhmetshin et al., 2018).

2. Methodology

The main methods used for this study are general scientific methods of cognition - system analysis, dialectics, methods of scientific abstraction, analysis and synthesis, economic and statistical methods, comparative analysis, and correlation and regression analysis.

The research focuses on the key factors and conditions contributing to human capital within the region's agricultural industries as well as the relationships that arise through the process of forming human capital. The theoretical and methodological framework of the study was the work of Russian and foreign scientists in the field of personnel management, personnel work, statistical collections, regulatory acts of the legislative and executive authorities of Russia, and the constituent entities of the Russian Federation; sectoral statistical reporting of the Ministry of Agriculture of the Russian Federation and regional governing bodies of the agro-industrial complex.
The object of observation is the labor resources of agricultural organizations in the Novosibirsk region. The object of the research is organizational and economic relations that arise in the process of forming the labor resources of agriculture in conditions. The subject of the research is mechanisms and trends that affect the formation of agricultural labor resources.

3. Results

The starting point for analyzing the problem of human capital is the realization that any single individual has a dual nature. (Hereinafter "individual" and "human" will be used interchangeably). Humans are both biological and social beings. This dual nature determines the development of an individual's personality as well as his potential as a set of vital economic resources (Minakhmetova et al., 2020; Yemelyanov et al., 2018). The individual develops his personal human capital through the process of socialization. This transformation is carried out through a complex system of interactions between an individual and society, which have an integrated character (both in a horizontal and a vertical form). Therefore, any holistic approach (or close to it) which explains the essence and meaning of human capital depends on recognizing the individual as the carrier of human capital. In this respect we can speak of individual or of collective human capital. "Collective" can refer to any community of people, both hierarchical (i.e., relying on formal social institutions) and non-hierarchical (for example, a spontaneous rally) but exhibiting a meaningful activity. These definitions relate to the predicate "human." On the other hand, in the formula of "human capital" the position of a subject is taken by a certain reality denoted by the concept "capital." In this discourse, the defining characteristics of the entire volume of the concept of a "human capital" include everything that brings income initiated by human activities (Popok et al., 2020; Panfilova et al., 2020). The main indicator (measuring factor) characterizing human capital is the number of employees with higher professional education. In 2018, the number of employees with a specialized education made up 2071 people including 913 with higher education and 1158 with secondary vocational education. At the same time, 25.3% of employees did not have any specialized education (Kusnetzova, 2020; Oteshova et al., 2020). See table 1 below.

Table 1. Human Resources of the Agricultural Sector in the Novosibirsk

Categories of Employees	Employees with a professional agricultural education						having no specialized education		demand	% of sufficiency
	higher		vocational		Total, having a specialized education					
	number	%	number	%	number	%	number	%		
Specialists, total (except senior specialists)	**913**	**32,9**	**1158**	**41,7**	**2071**	**74,7**	**703**	**25,3**	**257**	**91,5**
Agronomists of all specialties	79	69,9	24	21,2	103	91,2	10	8,8	12	90,4
Livestock specialists of all specialties including stock breeders, breeding technicians, breeding record keepers	71	48,0	49	33,1	120	81,1	28	18,9	20	88,1
Veterinarians, veterinary assistants, veterinary officer	85	25,0	165	48,5	250	73,5	90	26,5	51	87,0
Herd reproduction specialists	8	3,7	84	38,7	92	42,4	125	57,6	39	84,8
Engineers and technicians of all specialties (mechanics, technologists, etc.)	104	38,5	100	37,0	204	75,6	66	24,4	15	94,7
Power engineers and electricians	67	27,0	111	44,8	178	71,8	70	28,2	18	93,2
Land reclamation engineers and hydraulic technicians	0	0,0	1	100,0	1	100,0	0	0,0	3	25,0
Economists of all specialties	69	71,6	2	26,9	66	98,5	1	1,5	2	97,1
Accountants of all specialties	997	37,7	65	48,6	804	86,3	128	13,7	65	93,5
Environmentalists	8	100,0	3	0,0	5	100,0	0	0,0	3	62,5
Other professional staff	462	21,9	29	35,3	248	57,3	185	42,7	29	93,7

Source: based on the data obtained from (Form 1-KMP).

It is worth noting that in the current conditions, the agricultural sector is provided with workers by 91.5%, while in 2015, the human resourcing made up 78%.

In our opinion, the fundamental factor contributing to the increase in the main financial results of the agricultural sector is the formed human capital of workers expressed in the qualifications of employees. To determine the degree of influence of the qualifications of specialists on the main performance indicators, we use the correlation and regression analysis. The correlation-regression analysis represents a statistical method for studying the influence of one or more variables on the final result. Independent variables are called regressors, and dependent variables are called criteria variables. Before assessing the dependence of these indicators, it is necessary to clarify which particular indicators should be used for the economic efficiency of agricultural enterprises. The main resulting financial indicators include profit before tax, net profit, losses, and the number of profitable and unprofitable enterprises and their share. These indicators give an integrated assessment of production activities which subsequently serves as the basis for calculating the cost efficiency index. In order to further determine the needs of the agricultural industry in qualified personnel, the authors set the goal of this study to identify the availability and forms of dependence of the number of profitable enterprises, profitability, net profit, and the gross agricultural output on the number of employees with higher agricultural education. This method relies on the processing of statistical information provided by state statistics authorities and the consolidated balance sheet of agricultural enterprises in the Novosibirsk Region. To analyze the dependence of the financial results of agricultural production on the qualifications of workers, a sample of $t = 18$ was selected for the period from 2000 to 2018, the results of which are presented in Table 2.

Table 2. Dynamics of the resulting performance indicators of agricultural enterprises in the Novosibirsk Region

Years	Indicators								
	The number of profitable agricultural enterprises	In% of the total number	Profit before tax	Sales revenue, thousand rubles	Net profit, thousand rubles	Gross output of agriculture presented in actual current prices, million rubles	Crop production	Livestock	Cost efficiency,%
t	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9
2000	872	75,4	1343571	6502949	830359	9509,7	5278,5	4231,2	4,8
2001	798	73,2	1866933	9264982	1364635	12626,2	6386,0	6140,2	6,1
2002	538	52,8	780169	9073836	3678971	10529,5	3855,7	6673,8	5,4
2003	578	60	1158617	10431863	344908	11873,3	4553,0	7320,3	7,8
2004	615	68,8	1772350	12053834	1052933	15712,0	7135,7	8576,3	6,5
2005	410	54,0	1256800	12467449	3331891	15612,7	6054,4	9558,3	7,7
2006	610	82	2714872	12655273	3465878	16340,8	6574,9	9765,9	9,0
2007	580	89,0	4046595	15277460	3678992	22517,9	10826,9	11691,0	14,3
2008	580	89,9	2715720	20555739	2294580	28638,7	13298,7	15339,8	10,8
2009	518	83,8	2744345	20273148	2160094	30233,7	13888,4	16345,3	8,4
2010	631	85,6	2793302	20651296	2934738	26051,2	9638,4	16412,8	10,3
2011	578	85,3	3383023	22841950	2758271	35106,3	13923,4	21182,9	10,3
2012	557	75,5	3703660	28967662	3086480	31742,8	9171,9	22570,9	11,7
2013	760	78,5	4622834	30683221	5020158	39928,2	14412,2	23516,0	6,3
2014	702	78,9	5938927	37438483	5829786	40260,4	13421,3	26839,1	18,4
2015	757	81,1	6645871	41350377	5759234	47929,4	18339,6	29589,8	21,3
2016	773	80,2	6485959	45790350	4359234	51113,4	19896,2	31217,2	16,8
2017	888	75,4	6020951	46839963	4356110	54254,5	20706,5	33548,0	11,2
2018	814	74,7	5321704	49684975	3629529	52655,8	19249,9	33405,6	7,1

Source: based on the data obtained from (Financial and economic activities of enterprises and organizations of the Novosibirsk region).

Explanatory variable X_1 is the number of employees with higher education, a person (Figure 1).
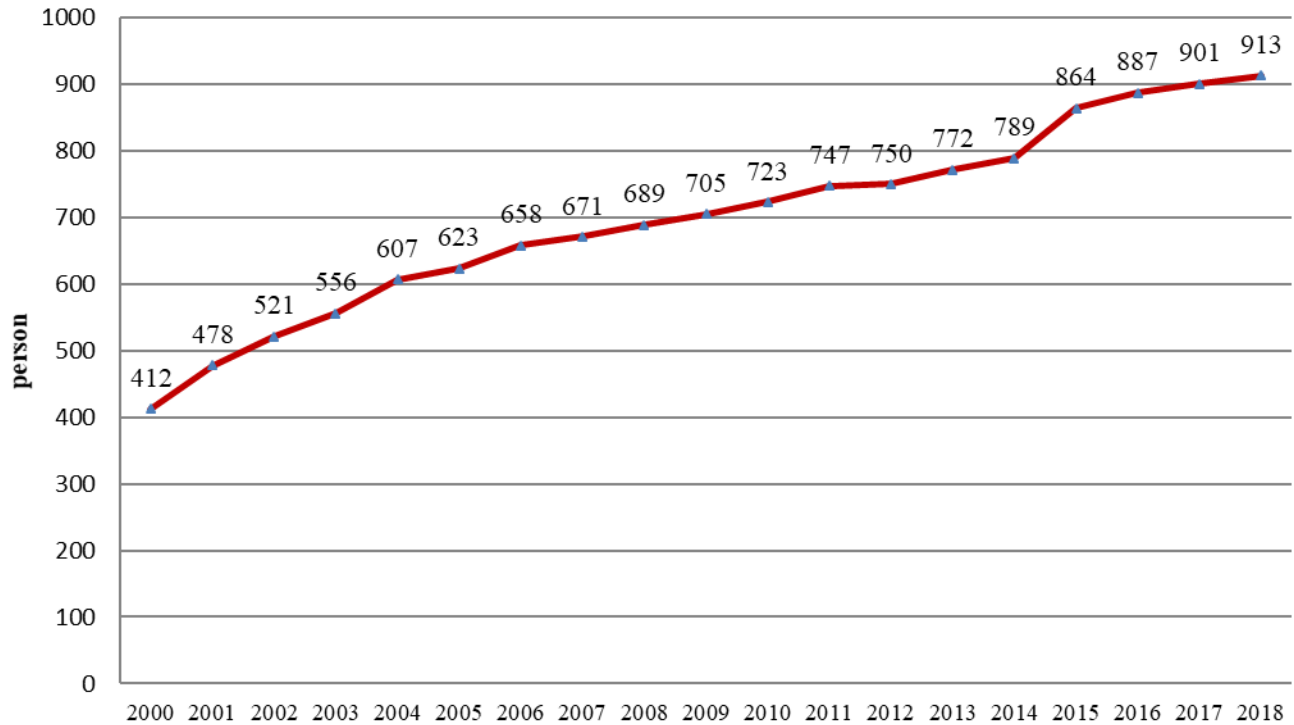

Figure 1. Dynamics of explanatory variable X_1
Source: based on the data obtained from (Agriculture of the Novosibirsk Region, 2019).

According to Figure 1, we will conduct a graphical analysis of factor X_1 according to its data from 2000 to 2018. The dynamics of factor X_1 has a pronounced upward trend. We draw the first hypothesis: there is an increase in the number of employees with higher education. The growth rate of factor X_1 decreases in time, except for 2003, 2005, 2010, and 2016. In 2003, 2005 and 2010 there was a slight increase in growth rates that did not affect the overall dynamics of factor X_1, and in 2016 there was a noticeable increase in the growth rate. We draw the second hypothesis on the change in factor X_1. The general trend of changes in the growth rate of factor X_1: there is a decrease in the growth rate of factor values. Thus, in terms of the number of employees with higher education from 2001 to 2018, the following hypotheses are true: there is an increase in the number of employees and a decrease in the growth rate of the number of employees with higher education.

Preliminary statistical analysis of production factors. To study the relationship between the number of employees with higher education and production in agriculture, we will determine the production factors which we will consider as effective indicators. As such indicator, we take the following: the gross income of enterprises, the profit of enterprises before tax, their net profit, revenue from sales presented in actual prices, cost efficiency, as well as the number of profitable and unprofitable enterprises. As indicators of profitable and unprofitable enterprises, it is possible to use their share in the total number of enterprises. These indicators will be connected with absolute values, so their study is auxiliary.

Our analysis will be based on the statistical information provided by the state statistics authorities and the consolidated balance sheet of the agricultural organizations of the Novosibirsk Region, and the sources.
As with independent variable X_1, we will sequentially conduct a graphical analysis of changes in production factors.

These factors are indicated as variable Y:

Y_1 – gross income of enterprises;

Y_2 – profit before tax;

Y_3 – net profit;

Y_4 – sales revenue;

Y_5 – cost efficiency.

Since the profit indicator is the main indicator characterizing the result of the entrepreneurial activity, we consider it reasonable to analyze the dynamics of the number of profitable agricultural enterprises (Figure 2).

Table 3. The number and proportion of profitable and unprofitable agricultural enterprises in the Novosibirsk Region

Years	The number of profitable agricultural enterprises	In % of the total number	Profit before tax	The number of unprofitable agricultural enterprises	In % of the total number	Negative profit
2000	872	75,4	1343571	285	24,6	300742
2001	798	73,2	1866933	292	26,8	470117
2002	538	52,8	780169	480	47,2	654804
2003	578	60	1158617	578	40	860380
2004	615	68,8	1772350	615	31,2	446340
2005	410	54,0	1256800	410	46	395856
2006	610	82	2714872	198	18	446340
2007	580	89,0	4046595	125	11	395856
2008	580	89,9	2715720	65	10,1	284994
2009	518	83,8	2744345	100	16,2	381739
2010	631	85,6	2793302	106	14,4	582818
2011	578	85,3	3383023	100	14,7	376932
2012	557	75,5	3703660	181	24,5	809068
2013	760	78,5	4622834	208	21,5	1462152
2014	702	78,9	5938927	188	21,1	809657
2015	757	81,1	6645871	176	18,9	738003
2016	773	80,2	6485959	191	19,8	595470
2017	888	75,4	6020951	289	24,6	1542755
2018	814	74,7	5321704	275	25,3	1570263

Source: based on the data obtained from (Agriculture of the Novosibirsk Region, 2019)

Over the past ten years, the proportion of profitable agricultural enterprises has been stable; the number of profitable organizations exceeds the number of the unprofitable ones. So, in 2018, the share of profitable enterprises made up 74%, the unprofitable ones - 26%. The amount of profit of agricultural enterprises of the Novosibirsk Region before tax made up 5 321 704 thousand rubles; the net profit made up 3 629 529 thousand rubles.
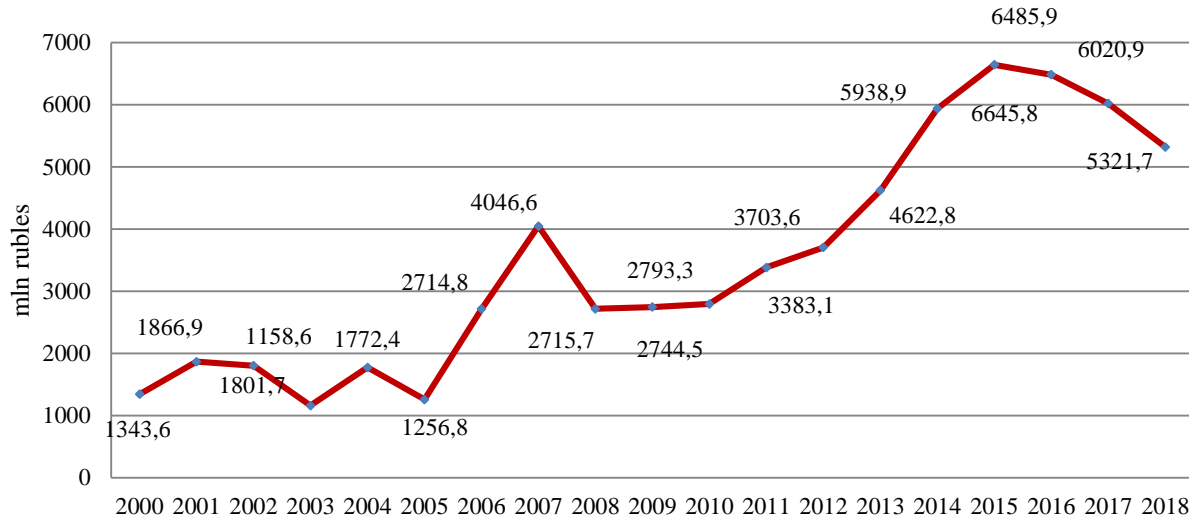
Figure 2. Profit before taxation of agricultural enterprises of the Novosibirsk Region
Source: based on the data obtained from (Agriculture of the Novosibirsk Region, 2019)

The result of the correlation and regression analysis showed that the qualifications of agricultural workers have a strong impact on profits. The value of the correlation coefficient is 0.89 (Table 4). There is a direct weak link between the number of profitable enterprises and the level of education of employees which confirms a correlation coefficient of 0.25. From an economic point of view, the growth of profitable agricultural enterprises can be explained by the imports phase-out program, the imposition of sanctions on a number of food products, the depreciation of the ruble, and the food price increase.

Table 4. The results of the correlation analysis of the dependence of the number of employees with higher education on the number of profitable and unprofitable agricultural enterprises in the Novosibirsk Region

	t	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	X17	X18
t	1,0																		
X1	0,3	1,0																	
X2	0,4	0,2	1,0																
X3	0,9	0,5	0,5	1,0															
X4	- 0,5	- 0,1	- 0,9	- 0,5	1,0														
X5	- 0,4	- 0,2	- 1,0	- 0,5	0,9	1,0													
X6	0,6	0,5	- 0,1	0,5	0,1	0,1	1,0												
X7	1,0	0,5	0,3	0,9	- 0,3	- 0,3	0,7	1,0											
X8	0,7	0,2	0,2	0,8	- 0,4	- 0,2	0,4	0,7	1,0										
X9	1,0	0,5	0,4	0,9	- 0,5	- 0,4	0,6	1,0	0,7	1,0									
X10	0,9	0,5	0,5	0,9	- 0,5	- 0,5	0,5	0,9	0,6	1,0	1,0								
X11	1,0	0,4	0,4	0,9	- 0,4	- 0,4	0,7	1,0	0,7	1,0	0,9	1,0							
X12	0,6	0,1	0,4	0,8	- 0,5	- 0,4	- 0,0	0,6	0,7	0,6	0,6	0,6	1,0						
X13	- 1,0	- 0,3	- 0,6	- 0,9	0,6	0,6	- 0,5	- 0,9	- 0,7	- 0,9	- 0,9	- 0,9	- 0,6	1,0					
X14	1,0	0,5	0,3	0,9	- 0,4	- 0,3	0,7	1,0	0,7	1,0	0,9	1,0	0,5	- 0,9	1,0				
X15	1,0	0,3	0,4	0,9	- 0,5	- 0,4	0,6	1,0	0,7	1,0	0,9	1,0	0,6	- 1,0	1,0	1,0			
X17	1,0	0,3	0,5	0,9	- 0,5	- 0,5	0,6	0,9	0,8	0,9	0,9	0,9	0,7	- 1,0	0,9	1,0	1,0		
X18	1,0	0,3	0,4	0,9	- 0,4	- 0,4	0,6	0,9	0,7	1,0	0,9	1,0	0,6	- 1,0	0,9	1,0	1,0	1,0	1,0

Source: based on the data obtained from (Financial and economic activities, 2019)

Graphical analysis of gross income of agricultural enterprises in the Novosibirsk Region.
Let us analyze the change in the gross income of agricultural enterprises in the Novosibirsk Region. The information for the analysis is presented in Figure 3. In addition, Figure 3 presents the data on the components of the gross output of agricultural enterprises by sectors of livestock and crop production.
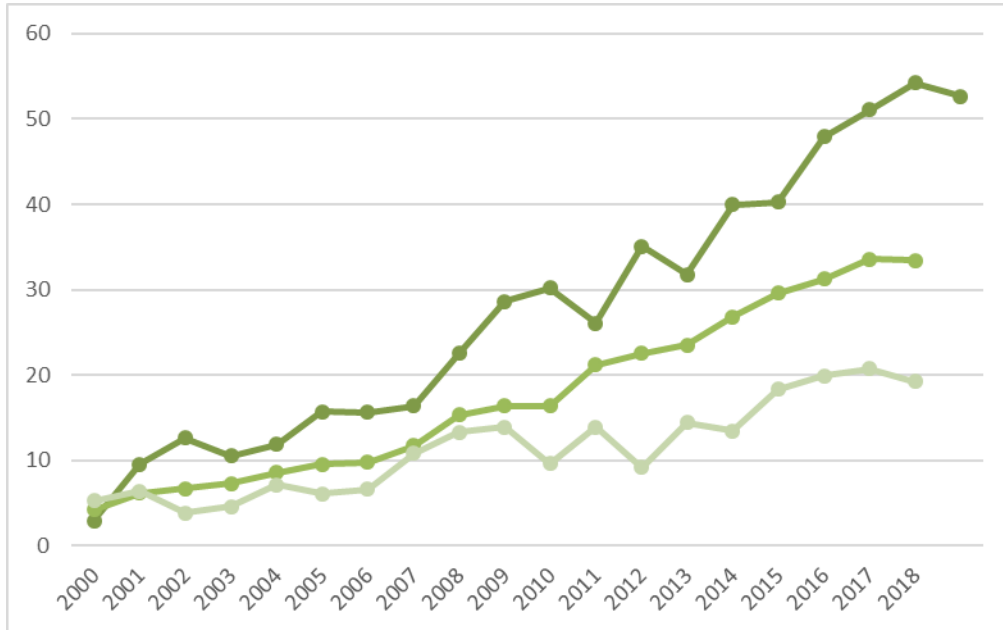

Figure 3. Dynamics of gross output of enterprises and livestock and crop production industries, Y_1.
Source: based on the data obtained from (Agriculture of the Novosibirsk Region, 2019)

The dynamics of Y_1 has a tendency to increase. We formulate the first hypothesis: there is an increase in the gross output of agricultural enterprises in the Novosibirsk Region. The growth rate of indicator Y_1 does not have a pronounced tendency and is subject to a random nature. In terms of the gross output from 2001 to 2018, we draw the following hypothesis: there is an increase in the gross output. Comparing the graphs of the values of X_1 and Y_1, we can say that there is no obvious similarity of the graphs; a change in indicator X_1 is less susceptible to random influences than indicator Y_1.

Let us consider in more detail the gross agricultural output of enterprises in the Novosibirsk Region. The components of indicator Y_1 are the following: the gross output of the livestock industry and the crop industry. The information on these indicators is presented in Table 3.

Table 3. Gross agricultural output in actual prices, million rubles

Years	Indicators		
	Total	Crop farming	Livestock
2000	9509,7	5278,5	4231,2
2001	12626,2	6386,0	6140,2
2002	10529,5	3855,7	6673,8
2003	11873,3	4553,0	7320,3
2004	15712,0	7135,7	8576,3
2005	15612,7	6054,4	9558,3
2006	16340,8	6574,9	9765,9
2007	22517,9	10826,9	11691,0
2008	28638,7	13298,7	15339,8
2009	30233,7	13888,4	16345,3
2010	26051,2	9638,4	16412,8
2011	35106,3	13923,4	21182,9
2012	31742,8	9171,9	22570,9
2013	39928,2	14412,2	23516,0
2014	40260,4	13421,3	26839,1
2015	47929,4	18339,6	29589,8
2016	51113,4	19896,2	31217,2
2017	54254,5	20706,5	33548,0
2018	52655,8	19249,9	33405,6

Source: based on the data obtained from (Financial and economic activities, 2019)

Considering the graph of variance in the gross output of the livestock industry, we can also assume that this indicator has a tendency to increase. We draw the first hypothesis: there is an increase in the livestock production in the Novosibirsk Region.

In contrast to indicator Y_1, the livestock production growth rates have a more stable tendency to change; it can be considered fluctuating with a positive trend. We draw the second hypothesis: there is a steady trend of positive growth rates in the livestock production.

Let us analyze the change in the gross output of the crop industry. The growth trend is noticeable for this indicator, but we will be critical of it. So, in the period from 2007 to 2014 there was no such a trend. The indicator increased and decreased; its value in 2014 did not change much compared to 2007. The growth trend of the indicator was observed from 2002 to 2007 and from 2014 to 2017 which influenced the final growth of the indicator from 2000 to 2018. Accordingly, there can be no talk of any trend in the rate of increase in growth. We underline the possibility of studying the dependence of the indicator on other factors.

It is worth noting that the gross output in agriculture is the sum of the gross output of livestock, crop production, and other indicators. This relationship is noticeable on the graph: there is a growth trend connected with the growth trend of the livestock industry and the absence of a growth trend connected with the absence of such a trend in the livestock industry.

Graphical analysis of profit before tax. The information for the analysis of changes in the indicator - profit before tax, is presented in Figure 4.
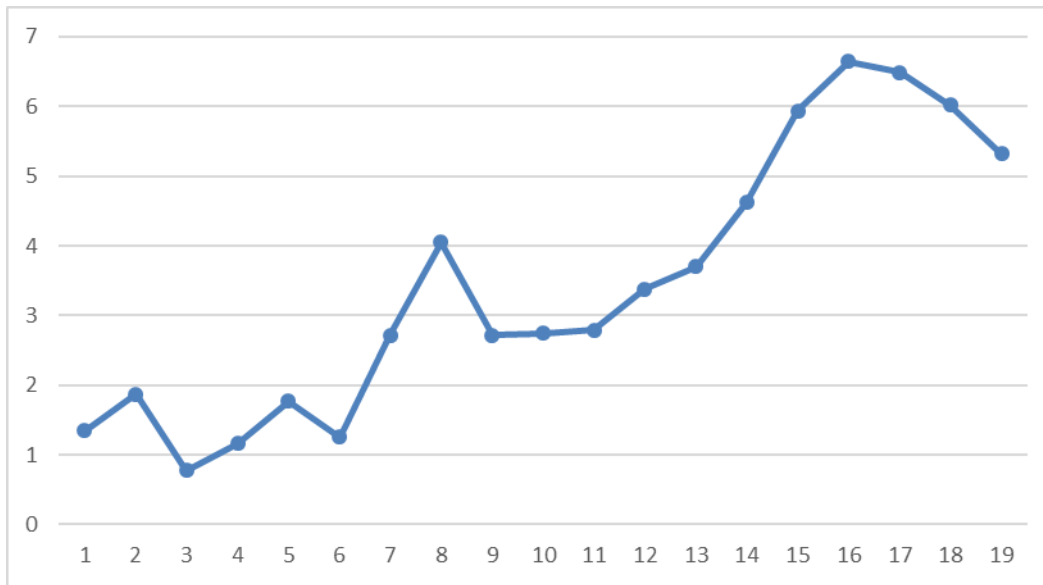
Figure 4. Change in profit before tax in the period from 2000 to 2019, Y_2.
Source: based on the data obtained from (Kuznetsova et al., 2020)

Profit before tax, Y_2, tends to increase, but with reservations. From 2001 to 2006, no trend was noticeable, after which, from 2006 to 2008, there was a significant increase in the indicator. Further, the growth trend manifests itself from 2011 to 2016, after which there is a decrease, and, notably, up to 2018. Therefore, a close relationship with indicator X_1 is also not relevant. We will not formulate the hypothesis.

Graphical analysis of net profit. We consider the analysis of the net profit of agricultural enterprises in the Novosibirsk Region of the Y_3 indicator. Data on this indicator is presented in Figure 5.
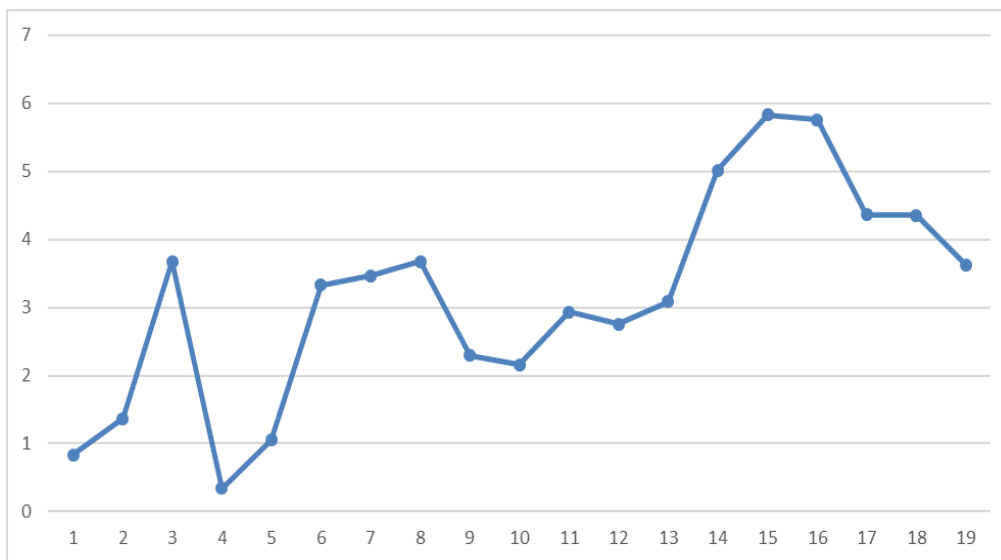
Figure 5. Net profit change of agricultural enterprises of the Novosibirsk region from 2001 to 2019, Y_3.
Source: based on the data obtained from (Financial and economic activities, 2019)

938

The net profit graph (Fig. 4) is similar to the pre-tax profit graph (Fig. 3). They vary in detail. The net income fell sharply in 2004 declining from 2008 to 2010 as well as from 2015 to 2019. Therefore, it does not make sense to talk about a tendency to change the indicator. If there are any trends or unaccounted effects, in this case it is the goal of other studies.

Graphical analysis of revenue from sales of agricultural organizations in the Novosibirsk Region. We turn to the analysis of indicator Y_4 - sales revenue. The information on this indicator is presented in Figure 6.
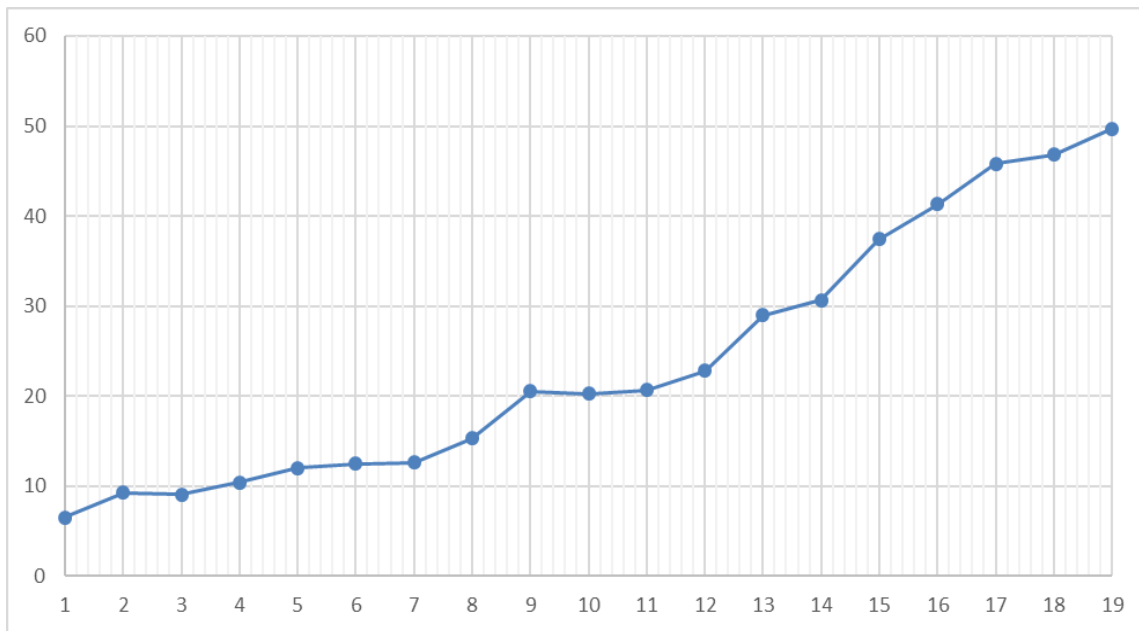
Figure 6. Dynamics of revenue from sales of agricultural enterprises of the Novosibirsk Region, Y_4.
Source: based on the data obtained from (Financial and economic activities, 2019)

The dynamics of Y_4 has a tendency to increase. The exceptions are the years of 2002 and 2009. But even there the decrease in the indicator is hardly noticeable. We draw the following hypothesis: there is an increase in revenue from sales of products of the agricultural enterprises in the Novosibirsk Region.

The growth rate of Y_4 does not have a pronounced trend, neither does Y_1. The growth rates are subject to randomness. Comparing the graphs of the values of X_1 and Y_4, we can say that there is a similarity of the graphs according to the growth trend, but the growth rates are not noticeable, since for X_1 there is a tendency to decrease in growth rates, but not for Y_4. We can talk about a possible strong or even close relationship between indicators X_1 and Y_4.

Graphical analysis of the profitability of agricultural enterprises in the Novosibirsk Region. Let us analyze the changes in the profitability of agricultural enterprises in the Novosibirsk Region. The data for the analysis are presented in Figure 7.

It is worth noting that the above indicators do not fully reflect the efficiency of production. They determine effectiveness in absolute terms. The relative indicators are equally important. One of these indicators is the profitability of production.

The indicator of cost efficiency is designated as Y_5.

Figure 7. Dynamics of profitability of the agricultural industry of the Novosibirsk Region, indicator Y_5, presented in %.
Source: based on the data obtained from (Novosibirsk Region, 2019)

According to Figure 8, there is no single trend for Y_5. It is appropriate to break the dynamics of changes in profitability into several periods. The first one is from 2000 to 2007. During this period, an increase is observed from 4.8 to 14.3. However, even in this period, a constant growth trend is not observed. The second period is 2008 to 2013. In this period, there is, first, a decrease in profitability, then an increase in the indicator. The period ends with a sharp drop in profitability comparable to the figures for 2000-2004. From 2014 to 2018, there is a sharp increase in the indicator, from 6.7 to 21.3 in 2013-2015, and then a sharp decrease from 21.3 to 7.1 in 20015-2018. As a result, the profitability of 2018 fell below the indicator of 2005.

The net effect is a change in the profitability indicator, independent of X_1. It is irrelevant to talk about a close relationship between these two indicators. The result of the correlation and regression analysis shows that the qualifications of agricultural employees have a strong impact on profits. The value of the correlation coefficient is 0.89.
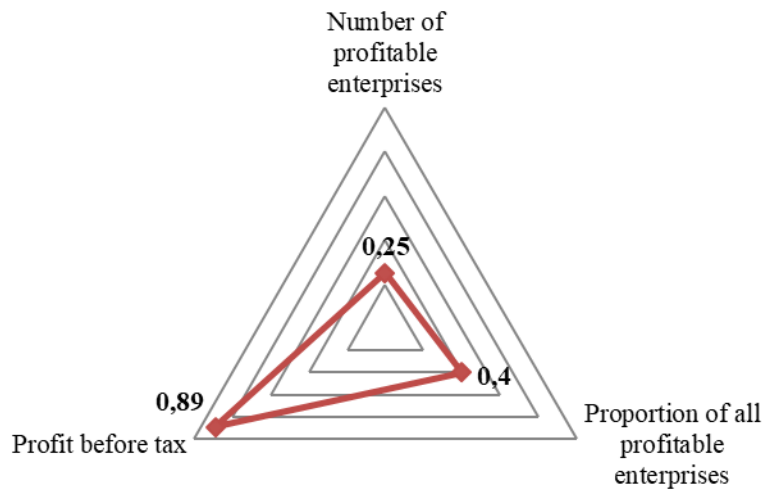

Figure 8. Correlation coefficients between the number of employees with higher specialized education and the number of profitable agricultural enterprises
Source: results, obtained by the authors

940

To sum up, it is necessary to underline the fact that the indicators characterizing the economic results of production activities are the main factors which show the financial well-being of enterprises. There is a direct weak link between the number of profitable enterprises and the level of education of employees which is confirmed by a correlation coefficient of 0.25. From an economic point of view, the growth of profitable agricultural enterprises can be explained by the imports phase-out program, the imposition of sanctions on a number of food products, the depreciation of the ruble, and a food price increase. The development of agricultural production is significantly affected by the number of employees with higher specialized education, especially on the growth in profit before tax (0.9), net profit (0.7), sales revenue (0.9), agricultural output (0.9), and cost efficiency (0.6).

4. Discussion

The research shows that labor resources play a significant role in shaping the final results (Taylor, 1996). Endlessly changing business and economic landscapes urge organizations to become resilient to ensure business survival and growth. Yet, in many cases, business world is becoming turbulent faster than organizations are becoming resilient. Relevant research indicates the ways through which organizations could respond to unforeseen events, mainly through suggesting that individual and group resilience could lead to an organizational one. However, research is nascent on how particularly human resource development (HRD) resilience could be built, and thus to contribute to organizational resilience as well (Mitsakis, 2020). Studies have established that science and technology applications have culminated in the discovery of new products, new processes, improved and faster services, and better ways of solving human and environmental challenges as well as opportunities for new jobs. Therefore, understanding and use of scientific knowledge is critical in responding to national development needs and challenges (Tetteh, 2020; Prodanova et al., 2018). At the same time, along with the significant impact of human capital on the final financial results, the state does not take enough measures to support employees involved in the industry (Lordan, 2017). In order to implement measures for the socio-economic development of rural areas, a comprehensive interaction between the state and business is necessary (Bernal, 2011).

5. Conclusion

The analysis enables development of the classification of human capital according to its affiliation with social institutions, which fulfills the function of reproduction of individual human capital. The functional analysis makes it possible to qualify human capital according to the types of substantive work (objective activities); in this case we determine its content and classify it using predicates added to the concept of "capital." As a result, we get the following types of capital: economic, human, social, physical, and others (Rudoy, 2016).

The structural analysis of types of capital is often determined through the consideration of specific types of capital in the discourse of their functioning in social institutions (Kuznetzova, 2020). In this case, human capital, a generic concept with a maximum content, is interpreted as alienable or inalienable from the individual. Thus, physical capital is considered as personal good, in all its manifestations, and educational, such as academic or intellectual, as public good. An active approach unites all types of capital and interprets them through the possibility of their integrated reproduction. It is the activity approach that allows us to consider human capital as an integral socio-economic formation through the identification of individual diversity of people as carriers of capital.

References

Akpey-Mensah, T.L. (2020). Social capital development as innovation in human resource development: A case of Technical Universities in Ghana. African Journal of Science, Technology, Innovation and Development, 12(1), 27-32

Akhmetshin, E. M., Vasilev, V. L., Mironov, D. S., Zatsarinnaya, E. I., Romanova, M. V., & Yumashev, A. V. (2018). Internal control system in enterprise management: Analysis and interaction matrices. European Research Studies Journal, 21(2), 728-740.

Agriculture of the Novosibirsk Region in 2018. Statistical Bulletin. Territorial Authority of the Federal State Statistics Service of the Novosibirsk Region, 2019.

Bernal, E. (2011). Profitability of ecological agrarian business and female labour productivity. International Business Management, 5(2), 58-65.

Bernardi, A. (2019). The capability approach and organizational climate as tools to study occupational health and safety. Insights into Regional Development, 1(2), 155-169. https://doi.org/10.9770/ird.2019.1.2(6)

Bykanova, O.A. & Akhmadeev, R.G. (2019). Universal VAT Loyalty Policy for B2B E-Commerce. Proceedings of the 34th International Business Information Management Association Conference, IBIMA 2019: Education Excellence and Management of Innovations through Sustainable Economic Competitive Advantage, 3046-3051.

Dmitrieva, I.S., Sharafutdinov, R.I., Gerasimov, V.O. & Pavlov, S.V. (2017). Method evaluation of the human capital with its innovational potential consideration and perspectives of regional development: The example of the Republic of Tatarstan and Volga Federal District regions. Espacios, 38(40)

Form 1-KMP of the Departmental Statistical Observation of the Ministry of Agriculture of Russia (Novosibirsk Region) "Information on the number, composition, and movement of workers of mass professions in the agro-industrial complex" over the years of 2000-2019.

Financial and economic activities of enterprises and organizations of the Novosibirsk region by type of economic activity for 2013-2018: statistical compilation, Territorial authority of the FSGS in the Novosibirsk Region, 2019.

Gapsalamov, A. R., Merzon, E. E., Kuznetsov, M. S., Vasilev, V. L., & Bochkareva, T. N. (2020). The education system in the context of socio-economic transformations. [O sistema educacional no contexto das transformações socioeconômicas] Periodico Tche Quimica, 17(34), 874-883.

Girdzijauskaite, E., Radzeviciene, A., Jakubavicius, A. (2019). Impact of international branch campus KPIs on the university competitiveness: FARE method, Insights into Regional Development, 1(2), 171-180. https://doi.org/10.9770/ird.2019.1.2(7)

Gladilina, I., Yumashev, A. V., Avdeeva, T. I., Fatkullina, A. A., & Gafiyatullina, E. A. (2018). Psychological and pedagogical aspects of increasing the educational process efficiency in a university for specialists in the field of physical education and sport. Espacios, 39(21)

Kazmina, I., Lukyanov, P., Zhminko, N., Savchenko, I., Yusupova, G., & Zatsarinnaya, E. (2020). Fourth industrial revolution-engineering innovations for labor productivity increasing. Talent Development and Excellence, 12, 477-487.

Klochko, E.N., Rybyantseva, M.S., & Oksanich, E.A. (2016). Development of controlling in postindustrial economy: Tools and techniques. International Journal of Economics and Financial Issues, 6(1S): 33-40.

Kuznetsova, I.G., Polyakova, A.G., Petrova, L.I., Artemova, E.I., Andreeva, T.V. (2020). The impact of Human capital on Engineering Innovations, International Journal of Emerging Trends in Engineering Research, 8(Special No 2 2020): 333-338.

Latyshev I.O. (2015). Methodological approaches to analyzing the indicators of human capital management in the interests of innovation development of enterprise. International Business Management, 9(6), 1565-1570. https://doi:10.3923/ibm.2015.1565.1570

Laužikas, M., Miliūtė, A. (2020). Human resource management effects on sustainability of high-tech companies: what Lithuania and South Korea can learn from each other. Insights into Regional Development, 2(2), 562-579. https://doi.org/10.9770/IRD.2020.2.2(5)

Lordan, J., Alegre, S., Montserrat, R., & Asín, L. (2017). Yield and profitability of 'Conference' pear in five training systems in North East of Spain. Spanish Journal of Agricultural Research, 15(3), e0904.

Mullakhmetov, K.S., Sadriev, R.D., & Gabaidullina, L.A. (2018). Influence of human capital characteristics on transformation of management and control in the management of social and economic systems. Paper presented at the Proceedings of the 31st International Business Information Management Association Conference, IBIMA 2018: Innovation Management and Education Excellence through Vision 2020, 3562-3572.

Minakhmetova, A. Z., Pyanova, E. N., Bochkareva, N. G., & Borisov, V. V. (2020). Digital socialization of teenagers. *Talent Development and Excellence, 12*(3), 292-300.

Mitsakis, F.V. (2020). Human resource development (HRD) resilience: a new 'success element' of organizational resilience? *Human Resource Development International*, 23(3), 321-328

Novosibirsk Region, 2018: a brief statistical digest, Rosstat territorial authority for the Novosibirsk region, 2019.

Oteshova, A. K., Prodanova, N. A., Gerasimova, L. N., Rodionova, L. N., & Barmuta, K. A. (2020). Analysis and ways to improve the rating of small businesses in the international assessment system. *Talent Development and Excellence, 12*(SpecialIssue3), 941-953.

Panfilova, E., Dzenzeliuk, N., Domnina, O., Morgunova, N., & Zatsarinnaya, E. (2020). The impact of cost allocation on key decisions of supply chain participants. *International Journal of Supply Chain Management*, 9(1), 552-558.

Popok, L., Ryabova, T., Bochkareva, N., Malinichev, D., Otto, O., & Perednikh, L. (2020). Foreign experience of development of agrarian market. *Talent Development and Excellence, 12*(SpecialIssue3), 512-519.

Prodanova, N., Trofimova, L., Pozdeeva, S., Melekhina, T., Rustanov, A., & Guryanova, I. (2019). Perspective of developing software for financial reporting under IFRS in the system of national governance. Journal of Advanced Research in Dynamical and Control Systems, 11(8 Special Issue), 406-410.

Rahman, P. A. (2018). Parallelization of combinatorial search when solving knapsack optimization problem on computing systems based on multicore processors. Journal of Physics: Conference Series, 1015(2). https://doi.org/10.1088/1742-6596/1015/2/022015

Rahman, P. A., & Bobkova, E. Y. (2017). The reliability model of the fault-tolerant border routing with two Internet services providers in the enterprise computer network. Journal of Physics: Conference Series, 803(1). https://doi.org/10.1088/1742-6596/803/1/012124

Rumman, A.A., Al-Abbadi, L., & Alshawabkeh, R. (2020). The impact of human resource development practices on employee engagement and performance in Jordanian family restaurants. Problems and Perspectives in Management, 18(1), 130-140

Sharafutdinov, R.I., Gerasimov, V.O., Yagudina, O.V., & Pavlov, S.V. (2017). Research of human capital in view of labour potential of staff: National companies case study. Paper presented at the Proceedings of the 29th International Business Information Management Association Conference - Education Excellence and Innovation Management through Vision 2020: From Regional Development Sustainability to Global Economic Growth, 839-852.

Taylor, M. (1996). Agriculture in recession: The regional financial performance of Australian broadacre livestock farming. New Zealand Geographer, 52(2), 46-55.

Tetteh, E.K., Akon-Yamga, G., Jumpah, E., Omari, R. (2020). Scientific human resource for national development in Ghana: Issues and challenges. African Journal of Science, Technology, Innovation and Development, 12(1), 57-68

Voronkova, O. Y., Sadykova, L. R., Avdeev, Y. M., Murzagalina, G. M., Surikov, Y. N., & Zatsarinnaya, E. I. (2020). Education in the field of technological entrepreneurship, based on the university's innovative resource base. *Talent Development and Excellence, 12*(SpecialIssue3), 444-453.

Yemelyanov, V., Tochilkina, T., Vasilieva, E., Nedelkin, A., & Shved, E. (2018). Computer diagnostics of the torpedo ladle cars. Paper presented at the AIP Conference Proceedings, 2034 https://doi.org/10.1063/1.5067351

Inna Gennadievna KUZNETSOVA, Ph.D in Economics, currently teaching the discipline "Economic Theory" at the Department of Economics of Novosibirsk State Agrarian University. She has experience in developing state programs for human resourcing the agricultural industry in the Novosibirsk Region.
Research interests: agriculture, human capital, human resources, government support, sustainable rural development, demography.
ORCID ID: https://orcid.org/0000-0001-9077-1578

Hilary Izuchukwu OKAGBUE, Ph.D. in Industrial Mathematics (Statistics option). Lecturer and Researcher, Department of Mathematics, College of Science and Technology, Covenant University, Ota, Nigeria. The author specializes in the study of Statistical learning, mathematical statistics, statistical data analysis and scientometrics. Currently engaged in teaching statistics and mathematics courses at the department of Mathematics, Covenant University, Ota, Nigeria.
Research interests: statistical learning, mathematical statistics, statistical data analysis and scientometrics.
ORCID ID: https://orcid.org/0000-0002-3779-9763

Alla Borisovna PLISOVA, PhD in Economics, Associate Professor, Department of Economics and Innovative Entrepreneurship, MIREA - Russian Technological University. Currently engaged in teaching economic and managerial disciplines and research in the field of state financial control, audit, controlling in the public sector, sustainable development of territories, innovation and economic education.
Research interests: controlling in the public sector, sustainable development of territories, innovation.
ORCID ID: https://orcid.org/0000-0001-6075-1488

Elena Evgenyevna NOEVA, Senior Lecturer, Department of Economics and Finance, Institute of Finance and Economics of North-Eastern Federal University named after M.K. Ammosov (NEFU).
Currently engaged in teaching economic and financial disciplines and research in the field of regional economics, sustainable development of territories, finance, entrepreneurship. Research interests: regional economics, sustainable development of territories, taxes, budget, entrepreneurship.
ORCID ID: http://orcid.org/0000-0003-3147-8050

Maria Vladimirovna MIKHAILOVA, senior lecturer at the Department of orthopedic dentistry of the E.V. Borovsky Institute of dentistry of the First Moscow state medical University I. M. Sechenova (Sechenov University), 8-2 Trubetskaya str., Moscow, 119991, Russian Federation, currently teaches clinical dentistry for undergraduates and postgraduates and conducts research on the development of a new concept for the treatment and rehabilitation of patients with comorbidities using modern digital technologies in orthopedic dentistry. She is a participant of the project 5-top 100 of the I. M. First Moscow state medical University. I. M. Sechenova, the only one among the country's medical universities, was included in the project to increase the competitiveness of leading Russian universities among the world's leading research and educational centers. Research interests: economics in dentistry, materials science, digital dentistry, human capital, manufacturing agricultural production.
ORCID ID: http://orcid.org/0000-0001-9267-1319

Galina Vladimirovna 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: http://orcid.org/0000-0002-3795-0830

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