

DIFFERENTIATION OF THE LEVEL OF LABOUR PRODUCTIVITY AND PAY AS THE BASIS FOR CHANGING THE LABOR MARKET

**Anas Makhmutov – Guzel Kolevid – Aleksander Kostyaev – Aleksander
Degtyarev – Galina Nikonova – Albina Akhmetyanova**

Abstract

There is a significant differentiation in the level of labor productivity not only between sectors of the economy, but also between countries. This is due to several factors. On the one hand, the cost of fixed assets used in the production process, their physical and moral deterioration. On the other hand, it is a differentiation in the value of the final product. On the third hand, this is the presence of a bobbly difference in the speed of performance of those or works, services. The difference in the level of labor productivity affects the level of wages and motivation for high-performance work. The high level of remuneration hypothetically contributes to the reproduction of the physical and psychological health of workers, is a good tool that can enhance innovation in all sectors of the economy. The purpose of this research is studying the difference in the level of labor productivity between countries and the world, studying the structure of the labor market in the world and to identify the factors that influence the growth of labor productivity. The relevance of this research topic increases with the growth of informatization, mechanization and automation of production, improvement of applied technologies and growth of labor productivity. The growth of labor productivity in some sectors of the economy leads to a decrease in the required labor resources and, consequently, to a redistribution of labor resources in the labor market.

Key words: level of labour productivity, labour market, wage, motivation

JEL Code: JEL E24, JEL J24, JEL J31

Introduction

In the context of globalization, the world has long ceased to be limited to territories, country names, and continents. The duration of a person's working life is not long. Therefore, people more selectively try to choose more prestigious and comfortable places to study, work, and relax. There is a significant difference between the maximum and minimum incomes of people in the world. Therefore, the motivation of people to work is also differentiated. In this

regard, the study of the issues of differentiating the level of labor productivity and wages, as well as the factors influencing them, is of considerable scientific and practical interest. We should understand the key factors contributing to the differentiation of labor productivity, its growth and the identification of changes in the modern labor market.

1 Literature overview

The main tasks of the modern millennium are task of increasing production per employee, as well as reducing labor costs per unit of production. The main objectives of state programs to increase productivity are: 1) the development of effective measures to increase productivity; 2) dissemination of knowledge in the field of labor productivity; 3) stimulating interest in improving labor productivity on the part of enterprises and public authorities.

In the modern world there are many changes in the labor market. On the one hand, over the past twenty-eight years, the number of labor resources has increased significantly. Besides, the development of information technology leads to an increase in labor productivity in some sectors of the economy and a reduction in the number of employees. Worldwide, there has been increased in the proportion of people employed in the service sector, information technology and information security. Relatively stable is the number of economically active population employed in industry. In many states and countries, the number of people employed in the agricultural sector is declining.

We agree with scientists, that “The far-reaching changes that we see in the modern labor market are due to its ever-changing structure and characteristics that stem from technological advances, demographic changes, globalization and the new world of labor» (Bercovici et al., 2019). The same conclusion is confirmed by other scientists.

According to Docquier, “changes in the age and educational structure of the labor resources of each industrial country act as the dominant influence on changes in wages” (Docquier, 2019). Wages allow replenishing the energy costs of a person for new types of activities, development of innovations, raising the level of culture, etc.

We agree with the authors that the level of remuneration determines the level of economic development. According to Maia, and Sakamoto, “the balance between wages and productivity is related to the degree of economic development” (Maia et al., 2018).

In Katovich and Maia (2018) notes that “labor productivity is an important long-term factor determining real wages; wage growth in the period 1996–2014 was not only the result

of institutional changes, but also the transformation of the production structure” (Katovich et al., 2018).

According to Korean scientists, "the productivity of larger enterprises is far ahead of the productivity of small firms" (Jung, 2019).

We agree with Alaghbari and other authors that “the productivity of labor in the construction industry is influenced by a group of technical and technological factors, and the laboriousness of the work performed is one of the highest” (Alaghbari, 2019).

Wossen and Ayele (2018) notes that "in Ethiopia, the labor sector is moving from the agricultural sector of the country into more productive sectors of the economy, in particular, into production and services." It should be noted that the trend of the flow of people from villages to cities and from agriculture to industry and services is happening everywhere in all countries of the world.

To solve the problem of a shortage of skilled labor, career growth, formal employment, systemic motivation can be offered to people; including by attracting the most qualified migrants (Kuznetsova, 2018, 2019). The agricultural industry is becoming less attractive to most people around the world. This is due to the four main reasons: 1) labor in agriculture is very often associated with hard manual labor; 2) the rate of return of capital is much longer than in other sectors of the economy; 3) the level of labor productivity in agriculture lags significantly behind labor productivity in other sectors of the economy; 4) the level of wages in the agricultural sector for a long time is lower than in other sectors of the economy (Kuznetsova, 2018).

The growth of labor productivity in some sectors of the economy and the lag in others contribute to maintaining the level of wage differentiation between sectors of the economy. Human life is too short. Therefore, people try to choose the sphere of labor that brings the most income. In addition, many people choose not only the sphere of the economy with higher wages, but also the countries where the level of wages is the most attractive.

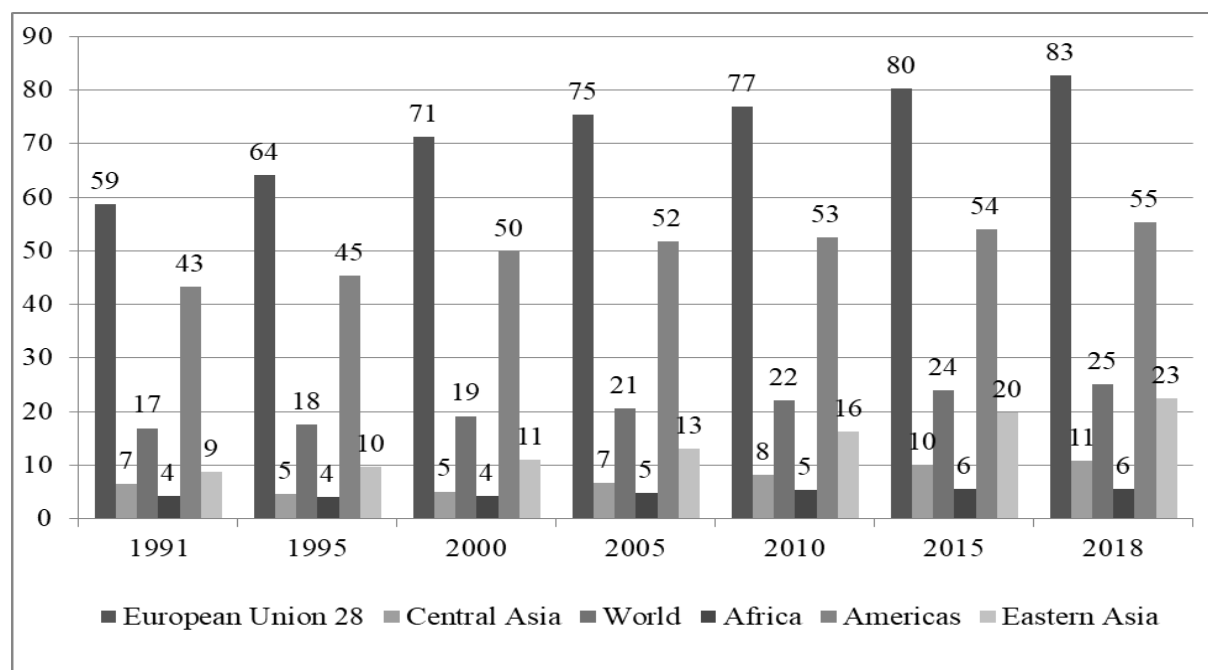
2 Statistical data analysis

According to official data of ILOSTAT, from 1991 to 2018, the economically active population in the world increased by 44.8%, including the economically active population of Africa increased by 2.1 times, America - by 55.1%, Central Asia - by 53 , 6%, East Asia - by 17%, in the European Union - by 13.1% (Figure 1).

The highest level of labor productivity per employee is recorded in the countries of the European Union. From 1991 to 2018, the average level of labor productivity in the EU

increased by 40.9%: from 58.7 to 82.7 thousand dollars per person. The second level of labor productivity is noted in the United States of America. Here, the level of labor productivity increased from 43.3 to 55.2 thousand dollars per person (by 27.5%).

Fig. 1 The level of labor productivity in the World



Source: Official website of the ILOSTAT <https://ilostat ilo.org/data/bulk/>

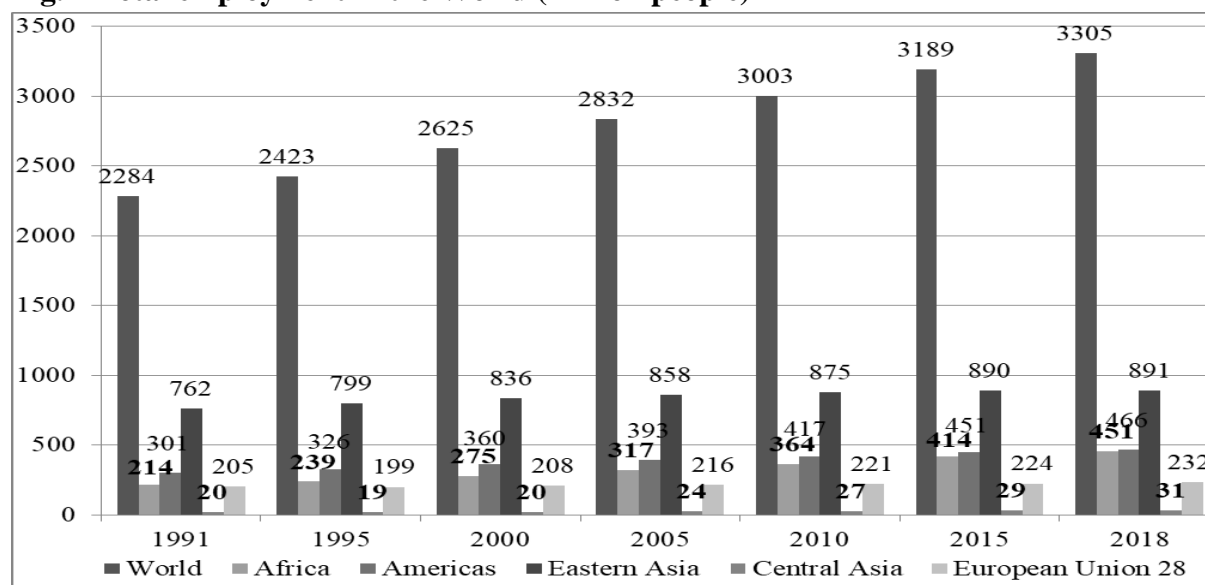
The world average value of the level of labor productivity in 1991 was equal to 16.9 thousand dollars, in 2018 - 25.2 thousand dollars, i.e. 49.2% more.

The lowest level of labor productivity in the world is in Africa. Despite the fact that productivity growth from 1991 to 2018 increased from 4.4 to 5.6 thousand dollars per person per year (27.3%), the difference with the level of labor productivity per employee in European countries Union lags 14.7 times behind, and the world labor productivity level is 4.5 times behind.

The level of labor productivity in the countries of Central Asia for the period under review increased from 6.5 to 10.9 thousand dollars per person (by 67.7%), but lags behind the average value in the countries of the European Union - by 7.6 times, from the world values - 2.3 times.

The level of labor productivity in East Asia for the analyzed period increased from 8.8 to 22.5 thousand dollars, i.e. 2.8 times. The lag in the level of labor productivity in East Asia from the level of labor productivity in the countries of the European Union is 3.7 times in 2018 (Figure 2).

Fig. 2 Total employment in the World (million people)

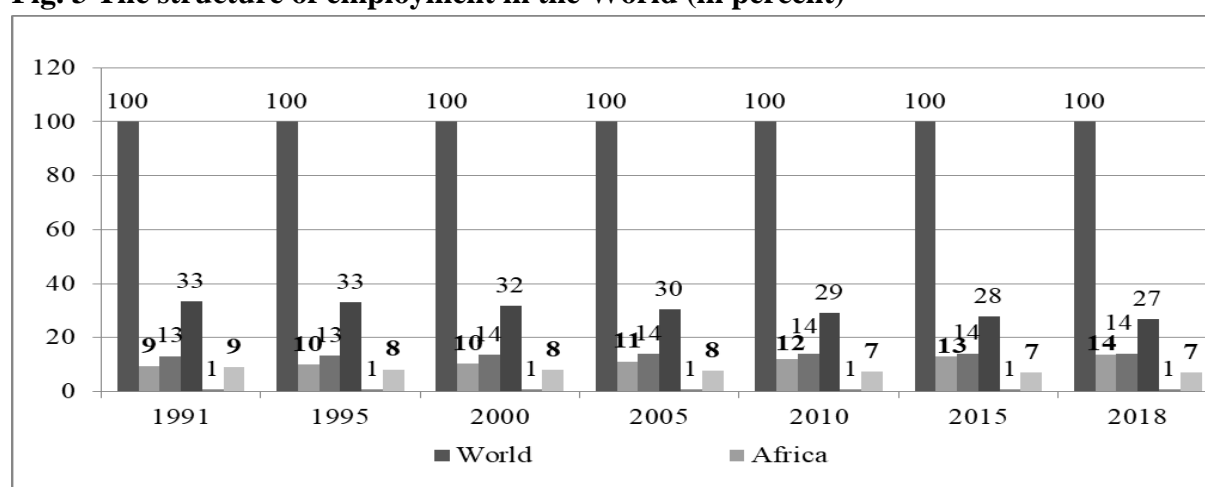


Source: Official website of the ILOSTAT <https://ilostat.ilo.org/data/bulk/>

The number of officially working people in the world increased from 2283.6 to 3305.3 million people, i.e. by 44.8%. In East Asia, the number of employees increased from 761.8 to 891.2 million people, i.e. by 17%. The number of workers in Africa increased from 214.4 to 451.3 million, i.e. 2.1 times. The number of employees in America increased from 300.6 to 466 million people, i.e. by 55.1%. The number of officially employed in Central Asia for the period analyzed increased from 19.9 to 30.5 million people, i.e. by 53.3%. In the countries of the European Union, the number of officially employed increased from 204.8 to 231.6 million people, i.e. by 13.1%.

Migration flows lead to a redistribution of labor resources in the world, which contributes to reducing the cost of labor and increasing unemployment. The relevance of this topic requires further research in this direction. Consider the structure of employment in the world (as a percentage) in Figure 3.

Fig. 3 The structure of employment in the World (in percent)



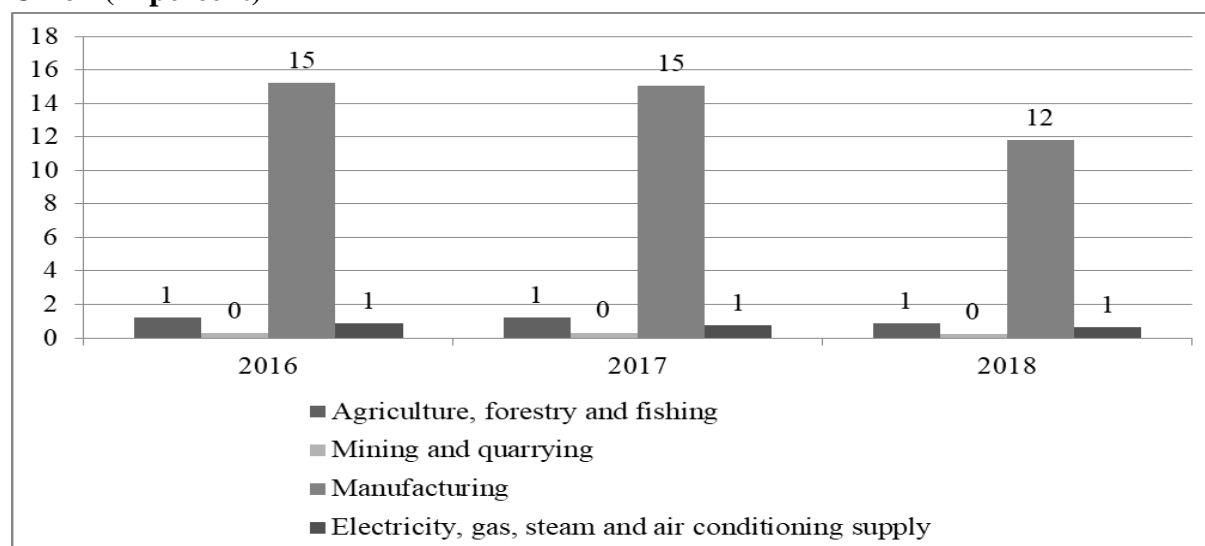
Source: Official website of the ILOSTAT <https://ilostat.ilo.org/data/bulk/>

As already noted, the number of officially working people in the world increased from 2,283.6 to 3,305.3 million people, i.e. by 44.8%. At the same time, the share of employed in East Asian countries decreased from 33.4% to 27% from 1991 to 2018. The share of officially employed in Africa increased from 9.4% to 13.7%. The proportion of workers in America increased from 13.2% to 14.1%. In the countries of the European Union, the share of employed decreased from 9 to 7%. In Central Asia, the proportion of employed, despite the overall quantitative increase, has not changed.

Consider the structure of employment by industry in the European Union for the period from 2016 to 2018 in Figure 4.

From the data of the figure it follows that only in the last three years the proportion of people employed in the rural, forestry and fishery industry in the countries of the European Union has decreased from 1.2 to 0.9%. In fact, the number declined from 165.7 to 149.3 thousand people, i.e. by almost 10%.

Fig. 4 The structure of employment in some sectors of the economy in the European Union (in percent)



Source: Official website of the ILOSTAT <https://ilostat.ilo.org/data/bulk/>

The proportion of people employed in the mining sector has not changed, amounting to 0.3% of the total amount of economically active people, and in quantitative terms - from 41.9 to 40.7 thousand people, i.e. by 2.9%. The proportion of people employed in industry decreased from 15.3 to 11.8%, while the actual number of employed jobs did not change, reaching 2050.3 thousand. Consider the annual growth rate of real gross domestic product (GDP) per worker (%) in some countries. In 2000, the highest level of GDP growth per worker was in Kazakhstan - 10.2%, in Russia - 5.1%, in the Czech Republic - 2.3%, in Slovakia - 1.6%, in Germany - 1, 4%, in France - 0.1%. In 2018, the level of GDP growth per worker in the Czech Republic was equal to 3.4%,

in Kazakhstan - 3.3%, in Russia - 2.3%, in Slovakia - 2.2%, in Germany - 1, 8%, in France - 1.4%.

The change in the structure of employment in the labor market is associated with an increase in labor productivity and wages. People who do not have the necessary level of competence become unemployed. The fact that the number of young people who are not studying and are not engaged in the economy is of great danger to society. The young people who choose professions that are in demand in the labor market and who are purposefully studying the necessary competencies usually have a steady career growth and stable earnings.

3 Identification of factors affecting labor productivity

To identify the factors affecting labor productivity (the ratio of gross output per person per year), we conducted a special correlation and regression analysis. As X1, we chose the indicator “Unemployment rate (in percent); X2 is the percentage of young people not engaged in the economy and not engaged in education (as a percentage); X3 - the level of Internet use (in percent). The interrelationship between the factors was carried out on the basis of official Eurostat data, using the example of 30 countries. The number of observations is 30. As a result of the analysis, it turned out that the multiple regression coefficient was 0.983. The tightness of the relationship between the factors was 96.6%. The conducted correlation and regression analysis allowed us to construct the following regression equation:

$$Y = 48 - 0.001 * X1 - 1.36 * X2 + 1.23 * X3 \quad (1)$$

A multiple correlation coefficient of 0.983 indicates a high degree of close relationship between Labor Productivity and the factors included in the model. The multiple coefficient of determination shows that the change in the “Y” index by 96% is explained by the change in the factors included in the model.

The significance of the regression equation as a whole is estimated using the Fisher F-criterion. At the same time, the null hypothesis (H0) is advanced on the statistical insignificance of the regression equation and the indicator of proximity of communication. For this purpose, a comparison of the actual F-factor equal to 23.2 is carried out. Since the F-factor > F-tab with a probability of 95.0%, we reject the hypothesis H0 and conclude that the regression equation and the proximity indicator of the relationship are statistical significance. Testing the model by the values of the t-criterion (0.05) and the F-criterion 19,8 (tabl. 2.049), the coefficient of determination (0.966) showed its accuracy, significance and adequacy. We

found that the indicator Y ("Labor productivity") is directly influenced by the indicator "The level of use of the Internet (in percent)", the reverse effect is exerted by the indicators: X2 is the percentage of young people not employed in the economy and not employed in the field of education (in percent) and X1 we chose the indicator "Unemployment rate (in percent)".

According to the results of the first regression model, it is necessary to conclude that the higher the level of Internet use, the higher the labor productivity. The lower the unemployment rate and the greater the percentage of young people who are not employed in the economy and students, the lower the labor productivity.

In the second model of the correlation-regression analysis, in order to identify the factors affecting labor productivity (the ratio of gross output per person per year), we conducted a special correlation and regression analysis. As X1, we chose the indicator "the level of Internet use (in percent)"; X2 - indicator "The level of labor costs". The number of observations is 30. As a result of the analysis, it turned out that the multiple regression coefficient was 0.99. The tightness of the relationship between the factors was 98.8%. The conducted correlation and regression analysis allowed us to construct the following regression equation:

$$Y = 0.71 * X1 + 1.37 * X2 \quad (2)$$

A multiple correlation coefficient of 0.99 indicates a high degree of close relationship between labor productivity and factors included in the model. The multiple coefficient of determination shows that a 98% change in the "Y" index is explained by a change in the factors included in the model.

The significance of the regression equation as a whole is estimated using the Fisher F-criterion. At the same time, the null hypothesis (H0) is advanced with respect to the statistical insignificance of the regression equation and the indicator of the proximity of the connection. For this purpose, a comparison is made of an actual F factor of 22.3. Since the F-factor > F-tab with a probability of 95.0%, we reject the H0 hypothesis and conclude that the regression equation and the proximity relationship indicator have statistical significance. Testing the model by the values of the t-criterion (0.03) and the F-criterion 34,4 (tabl. 2.049), the coefficient of determination (0.988) showed its accuracy, significance and adequacy.

We found that the indicator Y ("Labor productivity") is directly influenced by the indicator "The level of Internet use (in percent)" and the indicator "The level of labor costs".

According to the results of the second regression model, it is necessary to conclude that the higher the level of Internet use and the cost of labor costs, the higher is labor productivity. Thus, we identified the factors that have a direct positive effect on the growth of labor productivity: the level of Internet use and the cost of labor costs. The rate of unemployment and the percentage of young people who are employed in the economy and enrolled have the opposite effect on labor productivity.

Conclusion

According to official data ILOSTAT, from 1991 to 2018, the economically active population of the world increased by 44.8%. The world average value of labor productivity in 1991 was 16.9 thousand dollars, in 2018 - 25.2 thousand dollars, that is, 49.2% more. The highest level of labor productivity per employee is recorded in the countries of the European Union. From 1991 to 2018, the average level of labor productivity in the EU increased by 40.9%: from 58.7 to 82.7 thousand dollars per person. The difference between the maximum and minimum level of labor productivity in the world is 14.7 times. In the countries of the European Union, the number of officially employed increased from 204.8 to 231.6 million people, that is, by 13.1%. In 2018, GDP growth per employee in the Czech Republic was 3.4%, in Kazakhstan - 3.3%, in Russia - 2.3%, in Slovakia - 2.2%, in Germany - 1.8%, in France - 1.4%. According to the results of the first regression model, we found that the higher the level of use of the Internet, the higher the labor productivity. The lower the unemployment rate and the higher the percentage of young people who are not employed in the economy and students, the lower the labor productivity.

References

1. Alaghbari, W., Al-Sakkaf, A.A., Sultan, B. (2019) Factors affecting construction labour productivity in Yemen. *International Journal of Construction Management*, Vol.1, Issue 1,79-91. doi: 10.1080/15623599.2017.1382091
2. Bercovici, G., Bercovici, A., Sandru, M.(2019) Effects of the fourth industrial revolution on the Israeli economy. *Quality-Access to Success*, Volume: 20, 61-66.
3. Docquier, F., Kone, ZL, Mattoo, A., Ozden, C. (2019) Labor market effects of demographic shifts and migration in OECD countries. *European Economic Review*, Vol., 113, 297-324. doi: 10.1016/j.euroecorev.2018.11.007

4. Jung, B, Lee, D., Rhee, SG, Shin, I (2019) Business Group Affiliation, Internal Labor Markets, External Capital Markets, and Labor Investment Efficiency. *Asia-Pacific journal of financial studies*, Vol. 48, Issue 1, 65-97. doi: 10.1111/ajfs.12245
5. Katovich, E.S, Maia, A.G. (2018) The relation between labor productivity and wages in Brazil: A relação entre produtividade de trabalho e salário no Brasil. *Nova Economia*, Vol. 28, Issue 1, 7-38. doi: 10.1590/0103-6351/3943
6. Kuznetsova A., Avzalov M., Gorbunov D., Stovba E. Trends and status of agribusiness in animal husbandry of the Russian federation. *Hradec Economic Days. Vol.9(1). Double-blind peer-reviewed proceedings part I. of the international scientific conference Hradec Economic Days 2019. PP. 519-527.*
7. Kuznetsova A., Kolevid G., Kostyev A., Nikonova G., Akhmetyanova A. Reproduction of the qualified personnel of working professions in agriculture. *Hradec Economic Days. Vol.9 (1). Double-blind peer-reviewed proceedings part II. of the international scientific conference Hradec Economic Days 2019. Vol (2). 9. PP.11-22.*
8. Kuznetsova A.R., Zagirova Z., Omarhanova Zh. Problems of poverty and motivation of workers to labor in the field of agriculture as effects of stagnant economy. *Hradec Economic Days. PT I, 2018. V: 8. pp. 523-538.*
9. Kuznetsova, A., Dvorakova, Z., Lankasova, R., Kostyaev, A., Nikoniva, G., Omarkhanova Zh. (2018) Influence of migration displacements on the formation of the labour market in the countries of the European Union. In: *12th International Days of Statistics and Economics, 2018, Praha, pp. 1007-1020.*
10. Kuznetsova, A., Lankasova, R., Akhmetiyanova, A., Omarkhanova, Zh.(2018) Migration processes and their impact on the labour market of Poland and neighboring countries. In: *Leadership, innovativeness and Entrepreneurship in a Sustainable Economy Book of Proceedings, 2018, Czestochowa, pp.406-411.*
11. Maia, A., Sakamoto, A. (2018) Does wage reflect labor productivity? A comparison between Brazil and the United States. *Brazilian Journal of Political Economy*, Vol.38, Issue 4, 629-649. doi: 10.1590/0101-35172018-2764
12. Wossen, T, Ayele, S. (2018) Ethiopia's Agricultural Transformation: Agribusiness' Contribution to Reducing Youth Unemployment. *Ids bulletin-institute of development studies*, Vol.49, Issue 5, 15-30. doi: 10.19088/1968-2018.171

Contact

1. Guzel Kolevid

Bashkir State Agrarian University

450001, Russia, Ufa, 50-letiya Oktyabrya St., 34-443.

<https://orcid.org/0000-0002-0588-375X>

[ResearcherID: G-3976-2018](#)

Mail zhizellaa@mail.ru

2. Anas Makhmutov

Academy of Sciences of the Republic of Bashkortostan

450001, Kirova st., 15, Ufa, Russia

Mail alfiya2050@gmail.com

3. Alexander Kostyaev

Northwest Research Institute of Economics and Organization of Agriculture.

Podbelskogo Highway 7, St. Petersburg, Pushkin

ORCID iD: 0000-0003-4041-6935

[ResearcherID: G-4692-2018](#)

Mail galekos46@gmail.com

4. Aleksander Degtyarev

Academy of Sciences of the Republic of Bashkortostan

450001, Kirova st., 15, Ufa, Russia

Mail aleks-degt@yandex.ru

5. Galina Nikonova

Northwest Research Institute of Economics and Organization of Agriculture.

Podbelskogo Highway 7, St. Petersburg, Pushkin

ORCID ID: 0000-0002-7605-0237

[ResearcherID: G-2365-2018](#)Mail galekos@yandex.ru

6. Albina Akhmetyanova (Russia, Ufa).

Federal State Budgetary Educational Institution of Higher Education “Bashkir State University”.

450076, Russia, Ufa, Zaki Validi St., 32.

ORCID: <https://orcid.org/0000-0002-5739-769X>

[Researcher ID: W-1036-2017](#)

Mail ai-albina@mail.ru