

LABOR PRODUCTIVITY AND FACTORS OF ITS GROWTH IN THE SUBJECTS OF THE RUSSIAN FEDERATION

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Abstract

The task of increasing the level of labor productivity in Russia is currently a priority and for its solution, the federal project "Labor Productivity and Employment Support" has been implemented since 2018. In general, for the period 2008-2017, the average annual growth rate of labor productivity in the Russian Federation amounted to 1.5%. The highest average annual growth rate of labor productivity was observed in the Belgorod region (5.3%), the lowest - in the Ivanovo region (-1.3%). The largest share of the number of highly productive jobs in the total number of highly productive jobs in the economy is characteristic of manufacturing (25%) and government administration and military security; social security (11%). Labor productivity growth in the constituent entities of the Russian Federation was due to a reduction in the number of employees. The linear relationship between labor productivity and average monthly accrued wages of employees of organizations by type of economic activity is characterized as moderate (40%). This situation is explained by the presence of high differentiation in wages within each type of economic activity, intra-industry competition and increased competitiveness.

Key words: labor productivity, industries, regions, Russia, level of labour productivity

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Introduction

Over the past thirty years, the number of labor resources has tended to increase. In the transition to industry 4.0, in the labor market in most countries of the world there is an increase in demand for competent and educated personnel, as well as a decrease in demand for low-skilled labor (Bercovici *et al.*, 2019; Docquier, 2019). It is scientifically proven that the economies of scale in solving the problems of increasing labor productivity are most positively expressed in large enterprises (Jung, 2019; Alagbari, 2019). Labor productivity growth is accompanied by an increase in labor remuneration of more highly educated and competent personnel (Maia *et al.*, 2018; Katovich *et al.*, 2018). All over the world there is a

redistribution of labor in the service sector from other sectors of the economy (Wossen & Ayele, 2018). As a rule, the indigenous people of large cities do not want to work in the positions of working professions, however, migrants coming from rural areas agree to any work in the city (Kuznetsova, 2018). Raising the level of labor productivity is a priority in industry 4.0, as worldwide there is an increase in intra-industry competition, increased competitiveness and the struggle for natural resources (Kuznetsova, 2019). The task of obtaining the largest cash income per unit of working time and increasing revenue per employee in modern conditions at any enterprise are of primary importance.

1 Statistical data analysis

The task of increasing the level of labor productivity in Russia is currently a priority and for its solution, the federal project “Labor productivity and employment support” has been implemented since 2018, within the framework of which it is planned to ensure the growth of labor productivity in large and medium enterprises of the basic non-primary sectors of the economy at least 5 % by 2025 and employment of the workers released at the same time at the level of 90% in relation to 2017, to create new jobs as a result of the implementation of investment projects, formed to introduce a training system aimed at teaching the basics of increasing labor productivity. From the beginning of the implementation of the national project, by the end of the first half of 2019, more than 500 enterprises from 36 regions of the Russian Federation became participants, more than 2800 employees were trained in tools for increasing labor productivity.

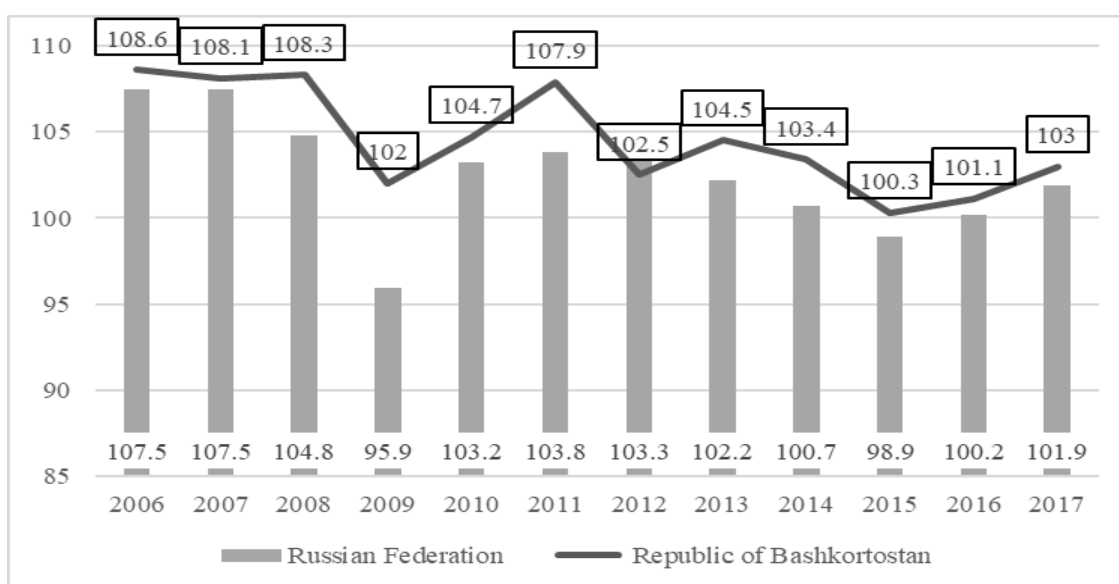
The Republic of Bashkortostan, – is one of the 83 regions of Russia, the with its high reproductive and labor potentials, was among the first pilot regions involved in the national project “Labor productivity and employment support” in 2017, is being implemented, which provides for the development and implementation of measures in the following areas: increasing labor productivity in enterprises participating in the program; employment support; creation of new jobs; the creation of a regional center of competencies to increase labor productivity; development of the export potential of enterprises of the Republic of Bashkortostan. There is an opinion that the nature of the problems of productivity growth and employment support is different, and underestimation of other factors of labor productivity growth (such as, for example, investments in modernization of production, management systems, logistics, etc.) threatens to fail to achieve the designated project targets. In this regard, the urgent problem of studying the factors of labor productivity growth in the regions

of the Russian Federation, as well as identifying the relationship of employment and unemployment with labor productivity.

2 Labor productivity trends in the Russian Federation and the Republic of Bashkortostan

For the analysis of labor productivity, there is an imperfection of methodological approaches to its measurement and a lack of data characterizing it, both in the whole of the Russian Federation and in the context of the country's subjects (Makhmutov, 2019). **Chyba! Nenalezen zdroj odkazů.**The Federal State Statistics Service publishes data only about the labor productivity index (Wossen & Ayele, 2018), which is calculated by the economy as a whole and by constituent entities of the Russian Federation as a quotient of the physical volume index of gross domestic product (or gross regional product) and the index of total labor costs. In the context of the constituent entities of the Russian Federation, data on the labor productivity index in accordance with the approved methodology are available from 2008 to 2017. Considers the long-term dynamics of the labor productivity index in the Russian Federation and the Republic of Bashkortostan (Kuznetsova *et al.*, 2020), it is possible to note the complex long-term trend of decline in labor productivity since 2009 (Figure 1).

Fig. 1: Dynamics of the productivity index in the Russian Federation and the Republic of Bashkortostan in 2006 - 2017,%



Source: Official website of the Federal State Statistics Service of the Russian Federation Source: <https://rosstat.gov.ru/> (Date accessed: 10.06.2020)

In 2010-2011, as well as in the last two years, there has been a recovery in labor productivity against the background of a sharp decrease in the workforce, as well as a low comparative base of the crisis years of 2009 and 2015. Among the subjects of the Russian Federation there is a high differentiation in the levels of labor productivity. In general, for the period 2008-2017. the average annual growth rate of labor productivity in the Russian Federation amounted to 101.5%. The highest average annual growth rate of labor productivity was observed in the Belgorod region (105.3%), the lowest - in the Ivanovo region (98.7%) (Table 1). Only in two constituent entities of the Russian Federation the Chechen Republic and the Ivanovo Region was a decrease in labor productivity for the period 2008–2017. In 2017, the leader in the rate of growth of labor productivity among the subjects of the Russian Federation was the Jewish Autonomous Region (113,%), the outsider - the Republic of Ingushetia (94.3%). High values of the labor productivity index of the Jewish Autonomous Region can be explained by the low comparison base of the previous two years: 98.4% and 99.0% in 2015 and 2016, respectively. It is noteworthy that among the leaders of 2017 in terms of labor productivity index, there is only one subject - Perm Territory was a participant in a pilot project to increase labor productivity. According to the results of 2017, in 13 regions of the Russian Federation a decrease in labor productivity was noted. For comparison, in 2015, against the backdrop of the currency crisis, a decrease in labor productivity was recorded in 29 constituent entities of the Russian Federation.

Tab. 1: Leaders among the constituent entities of the Russian Federation by labor productivity index in 2000 and 2018, thousand people

№	Leaders 2017		Leaders 2008-2017	
	The subject of the Russian Federation	Labor productivity index	The subject of the Russian Federation	Average annual labor productivity index
1.	Jewish Autonomous Region	113,5	Belgorod region	105,3
2.	Astrakhan region	110,0	Kaluga region	105,2
3.	Kaluga region	107,4	Republic of Adygea	105,2
4.	Magadan Region	106,3	Mari El Republic	104,9
5.	Perm region	106,3	Bryansk region	104,6
6.	Bryansk region	105,7	Tambov Region	104,6
7.	Saratov region	105,6	Astrakhan region	104,6
8.	Leningrad region	105,5	Novgorod region	104,5
9.	Mari El Republic	104,9	The Republic of Dagestan	104,1
10.	Novgorod region	104,8	Voronezh region	104,1

Source: Official website of the Federal State Statistics Service of the Russian Federation Source: <https://rosstat.gov.ru/> (Date accessed: 10.06.2020)

The Republic of Bashkortostan in the ranking of average annual growth rates of labor productivity for the period 2008-2017 takes 16th position with a value of 103.7%. According to the data for 2017, the labor productivity index in the republic amounted to 103.0%, which allowed it to take only 31st place in the rating according to the corresponding indicator (in the crisis year 2015 - 100.3% and 44th place in the rating). The problem of low growth rates of labor productivity in the Republic of Bashkortostan with a high labor potential proves the necessity and timeliness of the region's inclusion in the national project to increase labor productivity.

Sectoral differences in labor productivity in the Republic of Bashkortostan

A high level of labor productivity is typical for manufacturing, low for financial and insurance activities. The gap in labor productivity by sectors of the economy is about 11 times. Labor productivity in six types of economic activity (three of which are industries) exceeds the national average. A comparative analysis of the distributions of labor productivity, the average wage level by type of economic activity and the number of highly productive places revealed their inconsistency for certain types of economic activity.

A high level of remuneration is observed in the extraction of minerals, and a low level in the activity of hotels and catering enterprises. Moreover, the gap in wage levels in these types of economic activities is 3.16 times. The level of wages in nine types of economic activity exceeds the national average. Low wages occur in agriculture and forestry, which ensures food security in the region. The average salary in such socially significant economic activities as education and activities in the field of health care and social services that ensure the reproduction of the human and labor potential of the region does not exceed the average salary in the region. The largest share of the number of highly productive jobs in the total number of highly productive jobs in the economy of the republic is characteristic of manufacturing (25.2%) and government administration and military security; social security (11.4%). An analysis of the correlation coefficients between the studied indicators allows us to conclude that there is a noticeable relationship only between labor productivity and the number of highly productive jobs by type of economic activity (0.56). The linear relationship between labor productivity and average monthly accrued wages of employees of organizations by type of economic activity is characterized as moderate (0.4). The lack of a linear relationship between the number of high-productivity jobs and average monthly wages by type of economic activity (0.03) is not obvious, since the criterion for classifying a

workplace as highly productive is only the level of wages. In part, this result can be explained by the presence of high differentiation in wages within the type of economic activity.

Thus, only industries are characterized by the ratio of high levels of labor productivity and average wages, as well as the share of high-productivity jobs by type of economic activity in the total number of high-productivity jobs in the region's economy. In this regard, an integrated approach is required, covering all types of economic activity and affecting three key problems - the growth of labor productivity, the reproduction of qualified personnel, the creation of high-performance jobs, a decent level of wages.

3. Growth factors of labor productivity in the subjects of the Russian Federation

In order to manage labor productivity, the task of identifying factors determining the territorial and temporary differentiation of productivity in the subjects of the Russian Federation in modern socio-economic conditions arises. This problem can be solved using econometric methods. The model for the labor productivity index was developed on the basis of data on economic development by subjects of the Russian Federation for the period 2010-2017. Among the factors of labor productivity, the following economic indicators were considered in the context of the constituent entities of the Russian Federation: change in the average annual number of employees (in% of the previous period); industrial production index (in% to the previous period); real accrued wages of employees of organizations (in% of the previous period); index of the physical volume of investments in fixed assets (in% of the previous period); change in the number of high-performance jobs (in% of the previous period); change in the number of unemployed aged 15-72 years (in% of the previous period); the share of added value of high-tech and knowledge-intensive industries in the region's GRP (in% of the total); the proportion of the employed population aged 15-72 with a higher level of education (according to sample labor force surveys; in% of the total); the proportion of the employed population aged 15-72 years with an average professional level of education in the training programs for mid-level specialists (according to sample labor force surveys; % of the total); the proportion of the employed population aged 15-72 years with an average professional level of education in training programs for skilled workers and employees (in % of the total).

The choice as a factor characterizing capital expenditures, investments in fixed assets instead of the cost of fixed assets is explained by the high deterioration of the latter and their

low load in certain sectors of the economy of the constituent entities of the Russian Federation.

Econometric modeling was carried out using panel data methods based on the specification for the type of extended Cobb-Douglas production function:

$$y_{it} = A \cdot \prod_k x_{kit}^{\alpha_k} \cdot e^{\gamma_t} \cdot e^{\beta_i} \cdot e^{u_{it}}, \quad (1)$$

where y_{it} is the dependent variable characterizing labor productivity of the i -th subject of the Russian Federation at time t , x_{kit} are the factors of influence of the i -th subject of the Russian Federation at time t , u_{it} are the remnants of the regression equation of the i -th subject of the Russian Federation at time t , β_i are the fixed individual effects, which characterize the immeasurable individual differences of the constituent entities of the Russian Federation, γ_t fixed time effects that characterize the changes for all constituent entities of the Russian Federation in time. The factor A characterizes the contribution of scientific and technological progress to economic growth.

Model (1) was evaluated in logarithms in the following form:

$$\ln y_{it} = \ln A + \sum_k \alpha_k \cdot \ln x_{kit} + \beta_i + \gamma_t + u_{it}. \quad (2)$$

The results of the evaluation of the model in the form (2) are presented in table. 2. When all variables were included in model 1, there were insignificant factors. In addition, there was a multicollinearity model caused by the presence of a noticeable correlation between the change in the number of high-performance jobs and the real accrued wages of employees of organizations in the constituent entities of the Russian Federation. With a step-by-step selection of factors, all insignificant factors were eliminated. The final set of significant factors is presented in table 2 (model 2).

Tab. 2: The results of modeling the labor productivity index in the regions of the Russian Federation in 2010-2017 (dependent variable is the logarithm of the labor productivity index in the subject of the Russian Federation)

Factors	Values of elasticity coefficients	
	Model 1	Model 2
Logarithm of Industrial Production Index	0,16***	0,15***
The logarithm of the change in the average number of employees	-0,54***	-0,48***
Logarithm of real accrued wages of employees of organizations	0,12**	0,10**
Logarithm of the index of physical volume of investment in fixed assets	0,05***	0,06***
Logarithm of the change in the number of high-performance jobs	0,04*	×
The logarithm of the change in the number of unemployed people aged 15-72 years	-0,01	-0,02**

Factors	Values of elasticity coefficients	
	Model 1	Model 2
The logarithm of the share of value added of high-tech and knowledge-intensive industries in the GRP of the subject	-0,03**	×
Logarithm of the share of the employed population aged 15-72 years with a higher level of education	0,003	×
The logarithm of the share of the employed population aged 15-72 years with an average professional level of education according to the training programs for mid-level specialists	0,001	×
The logarithm of the share of the employed population aged 15-72 years with an average professional level of education according to the training programs for skilled workers and employees	-0,004	×
Constant (Logarithm A)	5,56***	5,48***

Notation: * – the significance of the coefficients at the level 10%; ** – the significance of the coefficients at the level 5%; *** – the significance of the coefficients at the level 1%,

× - non-inclusion of the relevant factor in the model.

Source: calculated by the authors.

Thus, according to the results of econometric modeling, it can be concluded that such factors affect the growth of labor productivity in the constituent entities of the Russian Federation, changes in the number of employed and the number of unemployed, growth in real wages, growth in investment in fixed assets. Hypotheses on the effect on the growth of labor productivity of the structure of people employed in the economy by the level of education in the subjects of the Russian Federation in the interval 2010-2017 during the study were not confirmed. Let us analyze the values of the coefficients of model 2, which represent the elasticity of the result relative to the corresponding factors. The largest percentage change in the labor productivity index was ensured in the analyzed interval due to a decrease in the number of people employed in the economy (-0.48%). Thus, the growth of labor productivity in the constituent entities of the Russian Federation occurred due to a reduction in the number of employees. The productivity growth was ensured by “light” factors associated with the presence of unloaded production capacities and excess labor. At the same time, a statistically significant effect on labor productivity has a change in the number of unemployed. A decrease in the number of unemployed by 1% in the subjects of the Russian Federation contributed to an increase in labor productivity.

Conclusion

Thus, reserves for the growth of labor productivity in the regions of the Russian Federation should be sought in increasing their innovative activity, increasing investment efficiency, creating new high-performance jobs, introducing high technologies, improving the organization of production processes, as well as increasing the professionalism and

qualification of workers. The increase in labor productivity should not occur with the aim of reducing the number of employees, due to an increase in production volumes.

In conclusion, the following can be cited as suggestions for improving the effectiveness of the activities of the program “Increasing labor productivity and supporting employment in the Republic of Bashkortostan”. Firstly, ensuring the involvement of large and medium-sized enterprises of different sectoral and territorial affiliations in participating in the implementation of the national project “Labor Productivity and Employment Support”. This will reduce the differentiation of labor productivity in the context of types of economic activity and municipalities, contribute to a balanced and integrated spatial development of the region’s economy. Secondly, the development of a program (“road map”) for the creation and modernization of high-performance jobs, as well as a system of support measures (for example, preferential credit rates, preferential subsidies, tax breaks, etc.) that will facilitate their creation. Work in this direction is currently actively carried out by the Ministry of Economic Development and Investment Policy. As part of the development of the program, measures should be envisaged to ensure the appropriate level of training of qualified personnel, increasing labor mobility to ensure the sectoral and spatial structure of the needs in the labor market, creating a monitoring system for the creation and elimination of jobs in the regional labor market.

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