

Neoindustrial Policy to Stimulate Labor Productivity in the Regions of Russia

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Abstract — The aim of the research is to identify characteristics, factors and tools to stimulate labor productivity in the regions of Russia under neoindustrialization. This issue remains urgent due to peculiarities and spatial unevenness of Russia's social and economic development. The research methods include statistical, comparative and econometric analysis. First, we made a comparative analysis of labor productivity in Russia and countries of the Organization for Economic Cooperation and Development from 2011 to 2016. Second, we estimated inter-regional differentiation of labor productivity in Russia for 2012-2017. Third, we analyzed the factors affecting labor productivity in the regions of Russia. And finally, we identified the key methods to stimulate labor productivity in the Russian regions. The results of the study confirmed a significant lag in labor productivity in Russia from most economically developed countries. However, the country is the leader in labor intensity in 2011-2016. Interregional differentiation of labor productivity in Russia is increasing. The relative number of high-performance jobs to the greatest extent depends on the level of socio-economic development of the region and the sectoral structure of its economy. Therefore, the choice of tools to increase productivity requires a differentiated approach, taking into account the peculiarities of regional development.

Keywords—*labor productivity; regions of Russia; high-performance jobs; industrial policy.*

I. INTRODUCTION

The new industrialization increases the importance of resources such as knowledge, information, intangible assets and human capital. The latter determines the ability of companies to generate and implement product-technological and organizational-managerial innovations, which are necessary due to the increasing turbulence of the external environment.

A significant number of researches are devoted to studying the following: identifying the factors that affect labor productivity growth of national economies; comparative analysis of productivity in various countries of the world (including in transitive and developed economies); assessing the impact of labor productivity on the welfare of various states; choosing types and instruments of industrial policy, stimulating various parameters of economic growth (including labor productivity).

For example, the influence of intensity and labor productivity on structural changes in the economy is studied quite actively [1], on employment [2] and on and the welfare of the population [3].

Many researchers study the influence of various socio-economic factors on labor productivity. Thus, a comparison of labor productivity in the public and private sectors of the US economy was conducted by Dewenter K.L. and Malatesta P.H. [4]. The impact of changes in working time on labor productivity was identified by Burda M.C., Hamermesh D.S., Stewart J. [5]. Most researchers define technological factors as the main determinants of productivity growth (and, consequently, payment), for example [6].

Nevertheless, low labor productivity limits the growth of national economy efficiency being necessary to widen and intensify the use of import substitution technologies.

Productivity growth has been under discussion among Russian experts recently. Russian researchers, studying the productivity of labor in Russia, usually focus on conducting cross-country comparisons, as well as on the analysis of sectoral dynamics of labor productivity in Russia [7, 8, 9]. It is worth mentioning the work in which reallocation processes occurring in the industries due to labor productivity growth are estimated [10]. The interregional differentiation of labor productivity is episodically explored, which confirms the high spatial unevenness of Russia's socioeconomic development [11]. So, the issue of developing the set of tools to stimulate

labor productivity growth and high-performance jobs creation in Russia is topical.

Both foreign research (see: [12], [13], [14], and Russian research [15, 16, 17] explored aims, principles and tools of industrial policy. A lot of Russian research analyzed jobs movement and qualitative evolution of jobs structure in economy [18, 19], by identifying and recording high-performance jobs [20, 21], dynamics of HPJs creation in regions [22] and specifics of their development in some sectors [23].

Thus, for Russia, as for many transitive economies, the problem of increasing labor productivity is traditionally important. However, the neoindustrial policy of stimulating labor productivity will be effective only if it takes into account the peculiarities of the country's economic development. Considering the peculiarities and spatial unevenness of Russia's social and economic development, it remains urgent to find effective methods for increasing labor productivity in the Russian regions.

The purpose of the study is to identify the features, factors and tools for stimulating labor productivity in the regions of Russia under neoindustrialization. To achieve the set goal, we consistently completed the following tasks. First, we made a comparative analysis of labor productivity in Russia and countries of the Organization for Economic Cooperation and (OECD) from 2011 to 2016. Second, we estimated interregional differentiation of labor productivity in Russia for 2012-2017. Third, we analyzed the factors affecting labor productivity in the regions of Russia. And finally, we identified the key methods to stimulate labor productivity in Russian regions (on the example of Sverdlovsk Oblast).

II. MATERIALS AND METHODS OF THE RESEARCH

Traditionally, labor productivity in national economies is estimated on the basis of productivity, income and labor intensity indicators (OECD Methodology). Labor productivity is measured as the ratio of gross value added (gross domestic product - GDP) in the country to the total number of employed people or working time. Labor yield is the ratio of gross added value, net of labor costs to the number of employed people or the total worked time. It is an indicator that characterizes the level of income brought by the labor resource in a particular territory. The intensity of labor reflects the average working time spent by the employee at the main workplace.

However, there are also "indirect" indicators of the labor productivity level. In the world practice of research in labor economics, the "qualitative" structure of jobs together with the factors of its evolution (changes) is actively studied. Also, the main parameters of the job "quality" are the qualification (most often measured by the education level) and the wages of employees. There can be observed improvement of the qualitative structure of jobs in the national economy if the share of jobs in the number of employed with a high level of education and wages increases. Thus, indirectly, labor productivity growth is indicated by the increase in the share of high-performance jobs (HPJs) in the total number of jobs in the country's economy.

In this study, we carry out a comprehensive assessment of labor productivity in the regions of Russia, based on

performance, profitability and labor intensity indicators, as well as on the absolute and relative number of HPJs.

Actually there are a number of disconnected criteria to define HPJs of both quantitative and qualitative character (Figure 2).

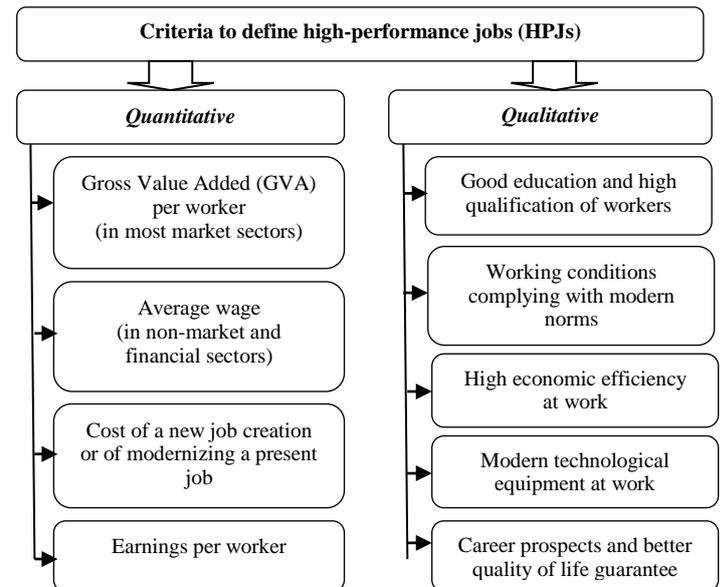


Fig. 1. Criteria to define high-performance jobs

This paper is based on the calculation methodology of defining the number of high-performance jobs developed by the Federal State Statistics Service of Russia. According to it, HPJs are "all the jobs filled by a company or an organization, where the average wage is equal to or higher than the stated threshold amount [24].

In this study, we made an attempt to comprehensively assess the productivity of labor in Russia, including measuring its interregional differentiation based on the number of HPJs.

The information basis for our research was the data of OECD and the Federal State Statistics Service of the Russian Federation, strategic and program documents of Russian Governments and RF regions (e.g. Sverdlovsk Oblast). We used the methods of comparative, statistic and econometric analysis to implement the research task.

To evaluate the interregional differentiation of HPJs number we calculated concentration indicators (concentration coefficient, Herfindahl-Hirschman Index (HHI)) and statistic indicators to estimate unevenness of allocation. To explain interregional differentiation of HPJs we conducted regression analysis of 2013-2015 panel data of Russian regions. For regression analysis we used «STATISTICA 10» software (Multiple Regression).

III. RESEARCH RESULTS AND DISCUSSION

To assess the level of labor efficiency in Russia, we conducted an analysis of the dynamics of labor productivity and labor intensity for 2011-2016. According to Table 2, in the period under study Russia experienced the lowest labor productivity: its level was lower than in the leading countries (the USA and Germany) 2.4 and 1.9 times, respectively.

TABLE I. PRODUCTIVITY OF LABOR OF ONE ABLE-BODIED PERSON, THOUSAND USD^a

Country	Productivity of labor of one able-bodied person, thousand USD ^a						Average annual growth rate, index
	2011	2012	2013	2014	2015	2016	
Austria	53.8	54.4	54.6	55.0	56.1	56.7	1.001
Czech Republic	33.5	33.9	33.8	34.2	36.1	36.3	1.012
Estonia	28.4	28.4	28.7	29.3	29.8	29.6	1.001
Finland	52.5	51.6	51.3	51.6	51.7	52.5	0.999
Germany	62.9	62.7	63.1	63.4	63.9	64.8	1.002
Hungary	33.2	32.8	33.0	33.7	33.1	32.7	0.996
Latvia	23.6	24.5	24.8	24.7	26.0	26.2	1.016
Poland	28.1	28.5	29.0	30.0	29.9	30.9	1.018
Slovakia	33.4	34.0	34.7	35.9	36.8	37.4	1.017
Slovenia	35.7	36.2	35.9	37.3	37.5	38.8	1.019
USA	61.4	62.3	62.2	63.1	63.8	63.8	1.008
Russia	23.8	24.3	24.5	24.7	24.0	23.7	0.999

Calculated as the ratio of Gross domestic product - GDP (2010, Constant prices, constant PPPs, OECD base year) to the number of able-bodied population

Comparison of labor productivity in Russia with the minimum value of the indicator in the sample also shows its low value (below the national average for Latvia in 2016 by 7%). In addition, Russia was one of three countries that demonstrated a negative dynamics of labor productivity in 2016 compared to its level in 2011. We also note that according to Table 1, countries with transitive economies (Slovakia, Czech Republic, Hungary, Poland, Slovenia, including countries of the post-Soviet space (Estonia, Latvia, Russia) are characterized by lower labor productivity compared to developed countries (USA, Germany, Austria, Finland).

The analysis of the labor intensity for selected OECD countries for 2011-2016 (Figure 2) shows that Russia is an absolute "leader" in terms of the number of hours worked by an employee per year (about 1980 hours) [26].

We can also indicate that the Russian economy is characterized by low labor productivity: thus, in 2014 the country took the last place (out of 30 OECD countries analyzed) [8]. At the same time, the highest level of labor productivity was observed in Norway, Ireland, France and the USA. The labor yield in Russia was lower compared to the leading countries (Norway and the USA) approximately 4 and 3 times, respectively. In the cohort of outsider countries in terms of labor productivity in 2014, South Korea, Mexico, Poland and Estonia were included in addition to Russia. Comparing the profitability of labor in Russia with those of Estonia and Poland, we can see a significant lag of almost 2 times.

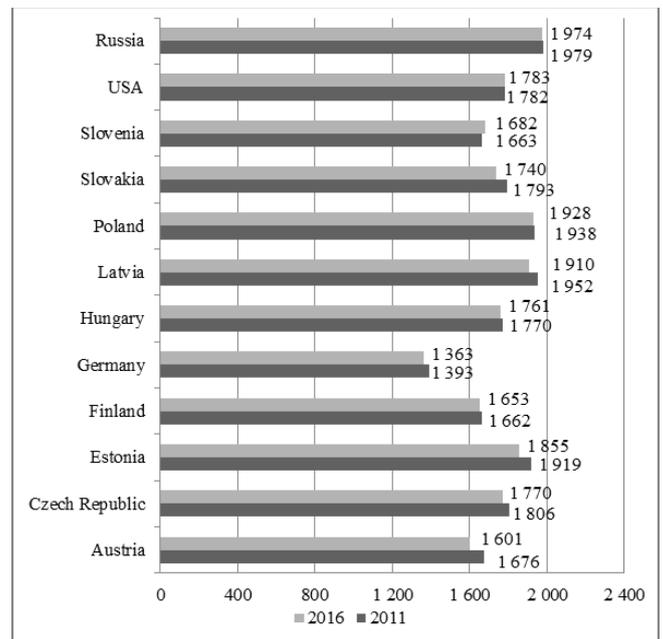


Fig. 2. Average Annual Hours Worked in OECD countries, Hours (2011-2016)

Thus, labor productivity in Russia is low alongside with the maximum intensity of "employee use". As a positive trend, researchers observe high rates of productivity growth and labor productivity in Russia in 2000-2014 [8]. However, this is mainly due to two reasons: the "low base effect" and the gradual recovery of the Russian economy in the post-reform period.

Due to the lack of representative data on labor productivity in the regions of Russia in 2012-2016, we further analyze the indicator of the number of high-productivity jobs indirectly reflecting the level of efficiency (including payment) of labor in the subjects of the Russian Federation.

According to the official statistics, by the beginning of 2018 there were created 17.114 million high-performance jobs (Fig. 2), which accounts only for 68,5% of the target (25 million of HPJ by 2020). Furthermore, the majority of HPJs is concentrated in manufacturing (20.6%), in state administration and military security (12.1%), in transport and communication (11.7%) and in real estate, lease and service activities (10.9%).

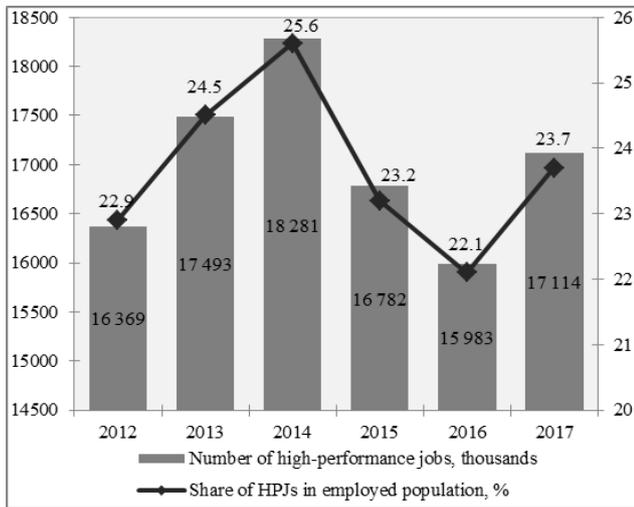


Fig. 3. Dynamics of creating high-performance jobs in Russia (2013-2017)^a

^aCalculated by authors. Source: Federal State Statistics Service of Russia. Available at www.gks.ru (accessed October 30, 2018)

To evaluate the level of interregional differentiation of HPJs in the Russian economy, we calculated the concentration indicators (Fig. 4).

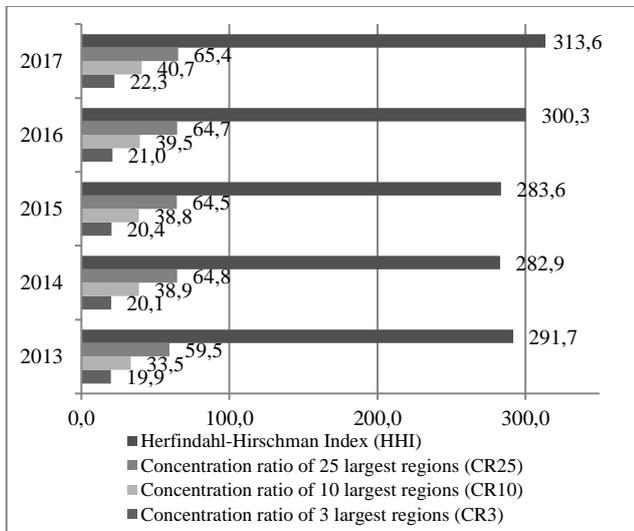


Fig. 4. Evaluating concentration and unequal allocation of HPJs in Russia, % (2013-2017)^a

Calculated by authors. Source: Federal State Statistics Service of Russia. Available at www.gks.ru (accessed September 24, 2018)

The results of evaluation indicate substantial interregional differences in HPJs spatial allocation. If we suppose that the regional allocation of HPJs depends on the level of region's economic development, then the level of gross regional product (GRP) concentration should approximately correspond to the level of HPJs concentration. Nevertheless, gross regional product concentration is twice higher than HPJs concentration (Herfindahl-Hirschman Indexes). Thus, the amount of HPJs depends not only on the general level of the region's social and economic development, but on other factors.

In order to explain HPJs interregional differentiation, we built and evaluated regression equation on 2013-2015 panel data of Russian regions:

$$HPJ_{it} = \alpha_0 + \alpha_1 \ln GRP_{it-1} + \alpha_2 \ln Inv_{it} + \alpha_3 MP_{it-1} + \alpha_4 MFP_{it-1} + \alpha_5 BE_{it-1} + \alpha_6 RMInv_{it} + \alpha_7 Unemp_{it} + \alpha_8 HEdu_{it} + \alpha_9 Dfa_{it} + \alpha_{10} InvGRP_{it-1} \quad (1)$$

where HPJ_{it} – share of HPJs in employed population of a region (i - region index, t - year); $\ln GRP_{it-1}$ – average per capita gross regional product (thousands roubles), with one year lag; $\ln Inv_{it}$ – investment in fixed capital per capita in the region (thousands roubles); MP_{it-1} – share of mining in gross regional product (%), with one year lag; BE_{it-1} – share of budget sector (education, health and social care, state administration and military security) in gross regional product (%), with one year lag; MFP_{it-1} – share of manufacturing in gross regional product (%), with one year lag; $RMInv_{it}$ – share of investment in machinery, equipment, vehicles in total investment in fixed assets aimed at reconstruction and modernization in region (%); $Unemp_{it}$ – unemployment rate in region, %; $HEdu_{it}$ – share of persons with higher professional education in the employed population of region (%); Dfa_{it} – wear of fixed assets (%); $InvGRP_{it-1}$ – share of investment in fixed capital in gross regional product (%).

Testing the model (1) detected multicollinearity between the indicators of average per capita gross regional product, investment in fixed capital per capita in the region and share of mining in GRP. So, the two latter variables were excluded from the regression equation. The econometric model is highly reliable (Table II).

TABLE II. RESULTS OF ECONOMETRIC ANALYSIS^a

Variable	Standardized regression coefficients ^b	Standard errors (SE)
Intercept	-133.21***	9.782350
Average per capita gross regional product, thousands roubles	10.958***	0.657659
Wear of fixed assets (%)	0.156***	0.039499
Share of budget sector in GRP, %	0.408***	0.059249
Share of investment in machinery, equipment, vehicles in total investment in fixed assets aimed at reconstruction and modernization in region, %	0.059**	0.020902
Unemployment rate in region, %	-0.237***	0.095636
Share of manufacturing in GRP, %	0.137***	0.038930
Share of persons with higher professional education in the employed population of region, %	0.050**	0.023092
Share of investment in fixed capital in gross regional product, %	0.088**	0.035281
Number of observations	240	
Multiple R	0.840621	
Multiple R ²	0.706644	
Adjusted R ²	0.695597	
F	63.967614	
P-value	0.000000	
Standard error of estimate	3.952773	

^aCalculated by authors in STATISTICA 10. Source: Federal State Statistics Service of Russia. Available at www.gks.ru (accessed December 18, 2018)

^bNotes: *** p<0.01; ** p<0.05

The hypothesis of the general level of the region's social and economic development impact on HPJs creation in the

region was confirmed: the average per capita GRP growth by 1% raises HPJs share in the region's employment by 10.96%. The excluded variable (investment in fixed capital per capita in the region and share of mining in GRP) makes a positive effect on the amount of HPJs in the region.

Expansion of budget sector and manufacturing in the region provides HPJs relative amount growth by 0.41% and 0.14%, respectively. Rise in qualification (education) level and employment rate growth contribute to the increase of HPJs amount in the region. The relative growth of investment in fixed capital stimulates HPJs creation in the region. The reasons for positive effect of fixed assets wear on HPJs increase in the region should be analyzed additionally.

To research the regional peculiarities of industrial policy stimulating HPJs creation we studied the case of Sverdlovsk Oblast in the Ural Federal Okrug. The parameters of HPJs creation in the region by 2020 were adopted by the Government of Sverdlovsk Oblast [25].

The regional program of stimulating HPJs creation foresees two possible scenarios. The inertial scenario suggests maintaining the average annual growth rate of staff turnover and its amount in the organizations of Sverdlovsk Oblast. The target scenario envisages a large-scale modernization, when insignificant staff reduction will be compensated by creating new jobs with higher labor productivity.

The regional industrial policy suggests using the following tools to stimulate labor productivity growth:

- rendering government support to the organizations with the status of priority investment project of Sverdlovsk Oblast in new construction, modernization, reconstruction and technical re-equipment of fixed assets;
- developing the system of infrastructure support of jobs creation and jobs modernization on the territory of Sverdlovsk Oblast;
- training and retraining personnel for new and modernized jobs;
- supporting jobs creation and jobs modernization in social sphere.

The implementation of the Regional Program provides a wide range of tools to stimulate job creation and labor productivity growth, including both direct financial support measures (for example, subsidies for nanoindustry infrastructure development, subsidies for innovations, grants for funding scientific projects, etc.) and indirect regulation (development of existing infrastructure elements (business incubators, technology parks, etc.), information and consulting support of enterprises and organizations concerning participation in the RF government programs, etc.).

The Program is based on the project principle: its implementation involves the completion of more than 200 projects that contribute to the creation of high-performance jobs in key sectors of the region's economy. Nevertheless, there is no quantitative assessment of the effectiveness of projects to create and modernize jobs in Sverdlovsk Oblast.

The main disadvantages of the regional program to stimulate productivity growth can be considered:

- no risk management system;
- non-complexity (fragmentation) of the program implementation mechanisms;

- unclear planning of the volume of investments necessary for the implementation of the Program and the sources of their financing.

In general, the experience of Sverdlovsk Oblast in implementing industrial policies to stimulate the creation and modernization of jobs can be considered successful: 590.9 thousand of HPJs were created in the region (by 1 January 2018), with the target value of 426.0 thousand units by 2018.

IV. CONCLUSION

The results of the study suggest that the gap in the level of labor productivity in Russia and the leading countries of the OECD (USA and Germany) is widening. In 2016, the hourly output in Russia was no more than 38% of the level of labor productivity of the "leading" states. Over the past 6 years (2011-2016), labor intensity in Russia decreased only by 5 hours per year (0.3%) and exceeded the similar figure in Germany by almost 1.5 times. Thus, the Russian economy is characterized by high labor intensity, but low labor productivity.

The criteria to identify high-performance jobs are interpreted in a heterogeneous way and evaluating their amount in the regions of Russia causes significant differences. Achieving the target of creating 25 million of HPJs by 2020 can be doubted due to the negative HPJs growth trend together with the limited budgetary financing and the high cost of credit resources.

The spatial unevenness of creating HPJs in the Russian economy is increasing. In the course of our research we analyzed econometric factors influencing HPJs interregional differentiation in Russia for the first time. We confirmed the hypothesis of positive dependence of HPJs amount in the region on the level of its social and economic development. We also determined that the amount of HPJs depends on sectoral structure of the regional economy (share of mining, manufacturing and budget sector in the structure of gross regional product).

In the Ural regions, various instruments of state incentives for increasing labor productivity are used. For example, the implementation of the vertical industrial policy in Sverdlovsk Oblast implies direct financial support for creating HPJs in the social sphere and priority industries. The measures of horizontal industrial policy include the development of infrastructure to support small and medium-sized businesses.

However, the mechanisms to stimulate productivity growth at the regional level require clarification, and the long payback periods of investments in the creation and modernization of high performance jobs limit the rate of their growth in regions with the low level of socio-economic development. Therefore, the development of the industrial policy to stimulate labor productivity in Russia requires a differentiated approach that takes into account the specifics of the socio-economic development of different regions.

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