SECTORAL RESERVES FOR INCREASING LABOR PRODUCTIVITY IN THE REGIONAL ECONOMY (CASE STUDY OF THE VOLOGDA REGION)

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Against the background of limited opportunities for economic growth caused by anti-Russian sanctions and a decrease in the number of employed people, the issue of finding possible ways to activate it is of particular importance. One of the main ways to boost economic growth is to increase labor productivity. There are more studies in the scientific community that aim to solve this problem at the national level. This circumstance actualizes the need for a methodological study

of the issue related to determining the directions of increasing labor productivity at the regional level, taking into account the industry specifics of the economy. The aim of the study is to propose and test methodological tools for identifying industry reserves to increase labor productivity in the region. The information base consists of data from the System of National Accounts, the Unified Interdepartmental Information and Statistical System, and the Federal State Statistics Service. An analysis of the dynamics of labor productivity in the Vologda Region has shown its unevenness due to its high sensitivity to crises. The region holds high positions in this indicator among Russian regions and averages in the Northwestern Federal District. The paper establishes that the highest level of labor productivity is characterized by the production of coke, basic chemicals and fertilizers, cast iron, steel and ferroalloys, as well as the manufacture of computer, electronic and optical products. Industries with untapped potential for increasing labor productivity have been identified, including trade and transportation, wholesale and retail trade, as well as a number of manufacturing industries. The scientific novelty of the research consists in the proposal of an approach to identify industries with reserves for increasing labor productivity, and its testing on the materials of the Vologda Region. The results can be useful for regional authorities to develop strategic documents and substantiate economic policy directions.

Labor productivity, methodological tools, Vologda Region, industry reserves.

ACKNOWLEDGMENT

Introduction

The Russian economy has faced a number of difficulties over the previous few years due to the imposition of sanctions restrictions. The restructuring of traditional supply routes with the search for new sales markets, the departure of large Western enterprises, adaptation to a high key rate, and ongoing economic instability limit economic growth opportunities (Shirokova, Lukin, 2024). These problems are also fully relevant for the Vologda Region, whose economy is mainly export-oriented. The demographic situation largely determines the economic dynamics in the region. Currently, there is a decrease in the number of people, including those employed in the economy (-38 thousand people, or 7.6% of the total number of employed in the region in 2017–2023[1]). In the future, a further decline in the population in general and people of working age in particular is predicted (Lukin, 2025). The consequence of these problems is an aggravation of the shortage of personnel, which serves as an obstacle to economic growth and increased production efficiency. Currently, characterized by a nationwide trend towards a forced decline in economic activity, the labor market situation in the Vologda Oblast is less tense. According to the data hh.ru In December 2024, the value of the

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[1]   The average annual number of people employed in the economy (calculations based on data integration) since 2017. EMISS. Available at: https://www.fedstat.ru/indicator/58994

HH index[2] in the region was 3.6, indicating a shortage of job seekers. By December 2025, the value of the indicator had increased to 6.9, moving into a zone of moderate competition. Nevertheless, a shortage of labor resources persists in a number of sectors of the region's economy[3].

In such conditions, it is particularly important to increase labor productivity, which can boost economic growth in the face of a shortage of personnel (Uzyakova, 2020). The importance of this issue is also recognized at the level of government, which is reflected in the strategic objectives of the country's development, the implementation of which is carried out through activities within the framework of the first national and later federal project "Labor Productivity"[4]. Productivity improvement as a response to the shortage of labor resources and the aging of the population is outlined in the Horizon 2040 project, launched by the Agency for Strategic Initiatives and the Russian Export Center[5].

Approaches to calculating labor productivity at the national level are widely represented in the scientific community. They allow studying cross-country differences and identify promising areas for productivity improvement. They apply aggregated indicators, the use of which at the regional level is complicated by the heterogeneity of the structure and coverage of statistical data. Another limitation of methods designed for the national level is that they do not take into account the industry specifics of specific regions. In addition, studies documenting the low labor productivity of the regional economy have not sufficiently explored the issue of identifying industries that are priorities for intervention, since issues of increasing productivity in specific industries at the national level prevail.

Thus, it is important to improve the methodological study of the issue when increasing labor productivity, which makes it possible to determine the directions for activating this process not only at the national but also at the regional level. In connection with the above, the purpose of the study is to propose and test methodological tools for identifying industry reserves for increasing labor productivity in the region. Within the framework of this study, the reserve for increasing labor productivity means a quantifiable difference between the actual level of productivity in a particular industry in a region and its potentially achievable level, determined based on comparison with advanced regions[6], under given conditions without a qualitative change in the technological structure.

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[2] The HH index shows the ratio of the number of active resumes to the number of vacancies in the labor market. HH Statistics. Available at: https://stats.hh.ru/vologodskaya_oblast

[3] Vologda Region has taken up the problem of personnel in the agricultural complex. Komsomolskaya Pravda. Available at: https://www.vologda.kp.ru/daily/27667.5/5055501/; It's not just Severstal that needs workers. The situation on the Vologda Region labor market is rapidly deteriorating. GorodChe.ru. Available at: https://www.gorodche.ru/society/5809742-rabochie-ruki-nujny-ne-tolko-severstali-situaciya-na-rynke-truda-vologodskoy-oblasti-stremitelno-uhudshaetsya/; Vologda region lacks qualified personnel for the use of robotics. News Agency "Vologda Region". Available at: https://vologdaregion.ru/news/2024/7/25/na-vologodchine-ne-hvataet-kvalificirovannyh-kadrov-dlya-primeneniya-robototehniki

[4] On the national development Goals of the Russian Federation for the period up to 2030 and for the future up to 2036: Presidential Decree 309, dated May 7, 2024.

[5] The horizon is 2040. The White Paper. Agency for Strategic Initiatives. Available at: https://asi.ru/library/main/198226/

[6] For example, Vologda woodworking is compared with the woodworking of the Arkhangelsk Region, the republics of Karelia and Komi, which have the highest labor productivity in Russia in this industry.

Theoretical background of the research

The importance of studying labor productivity is determined by its impact on the growth potential of the economy (Goel et al., 2017). There is also an inverse relationship with the quality of economic system growth. When it increases, productivity factors such as wages and technological shifts become more active. Other determining factors include the productivity of using primary resources and the volume of investments (Uzyakova, Shirov, 2024), and the capital ratio of labor (Samusenko, Zimniakova, 2021). This list is not exhaustive. Experts cite such reasons for low labor productivity in Russia as a high degree of depreciation of fixed assets at low rates of their renewal, the use of outdated technologies, inefficient use of labor resources, low labor motivation, etc. (Voikina, 2018; Zotikov, 2022).

The differentiation of Russian regions in terms of labor productivity is determined by the uneven distribution of labor resources and differences in personnel training systems, the concentration of highly qualified personnel in metropolitan regions and major agglomerations, different availability of natural resources, etc. In this regard, financial incentives, improvement of the institutional environment, and provision of targeted support to enterprises by competence centers are becoming key areas in ensuring productivity growth (Trofimova et al., 2022).

The scientific community presents several approaches to measuring labor productivity based on different indicators. Abroad, a number of studies at the national level use GDP data, and purchasing power parity is taken into account when studying cross-country differences. The values obtained are divided either by the number of employees or by the number of hours worked (Zotikov, 2024; Durdyev et al., 2012). The ratio of value added to labor costs, total cost to sales of manufactured products (Hannula, 2002), and production volume to costs (Enhassi et al., 2007) is calculated. Labor productivity is also considered as the output of goods or sales produced by employees of enterprises over a certain period of time (Calcagnini, Travaglini, 2014; Abad et al., 2013), etc. Machine learning methods are used in the academic environment (Golnaraghi et al., 2019).

In Russian practice, the most widely used methods are based on data on the volume of output in value terms and the average annual number of employed people (Tokmurzin, Shed'ko, 2021). Research is being conducted on trends and factors of labor productivity in general (Leonidova, Ivanovskaya, 2021) and in certain industries, such as metallurgy (Kuznetsova et al., 2023), agriculture (Akmarov et al., 2019), and the service sector (Kuchina, Korkina, 2019), and their relationship to structural shifts in employment (Leonidova et al., 2025). Data on the gross output of each type of activity is also used (Uzyakova, Shirov, 2024). Another approach is proposed in the methodology for calculating the labor productivity index developed by the Ministry of Economic Development[7]. It can be calculated for different levels: the economy as a whole, in the sectoral or regional context. This parameter represents the ratio of the indices of the physical volume of gross value added (GVA) and total costs.

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[7]   On approval of the Methodology for calculating the Labor Productivity Index indicator: Order 274 of the Federal State Statistics Service, dated April 28, 2018.

Of particular interest is the monitoring of labor productivity by the Center for Macroeconomic Analysis and Short-Term Forecasting (CMASF)[8]. It compares labor productivity in Russia with similar indicators in other countries of the world, and also identifies internal differences between groups of industries within the national economy. A comprehensive description of the issue under study is presented. Monitoring makes it possible to identify reserves for productivity improvement, to name those sectors of the economy in which it is possible to free up the employed population for its transfer to industries with a shortage of personnel. The calculated indicators here are based on information on GDP and GVA, including PPP, when identifying cross-country differences, and employment.

Thus, the analysis of approaches to labor productivity characteristics makes it possible to combine the data used in the calculation into several groups. The first includes parameters that reflect the volume of production of the industry or the economy as a whole. The indicators of the second group correspond to a cost-based approach, for example, information about labor costs or the cost of production. The third group is employment data. To describe the current level of labor productivity and identify its industry reserves, the most optimal approach is based on data on output and employment due to the availability of up-to-date information in statistical databases and the possibility of comparing them. Since the presented approaches are aimed at calculating labor productivity at the national level, this study adapts the methodology to the regional context, taking into account the specifics of statistical data. It fills a gap in the toolkit for identifying industry reserves in the region.

Research methodology

Our work is based on the above-mentioned CMASF study. The analysis of labor productivity includes two blocks. The first one is devoted to cross-country differences in labor productivity. Calculated as the ratio of GDP to PPP per capita, the indicator served as the basis for indicating Russia's position among the countries of the world, reflecting the share of the median level of three groups of countries: the United States, Western and Northern European countries, as well as Eastern Europe in the period from 2000 to 2023. The second block is devoted to the study of industrial characteristics of labor productivity in Russia. The ratio of GVA to PPP per employee was used as a key parameter for comparison. As in the first block, the values obtained for the sectors of the domestic economy are compared with the levels of European countries and the United States, as well as industry averages. Within the framework of the tools we propose, labor productivity analysis is based on the calculation of an indicator representing the ratio of GVA and the number of employees. Due to the lack of data on the low degree of aggregation of GVA, the industry characteristics used information on the volume of shipped products, given in the comparable prices of 2023 through production indices and price indices[9] for 2017–2023, correlated with the average annual number of employees. The industry reserves for increasing labor productivity were identified by comparing the previously obtained values with the regional average and comparing them with the leading regions.

The first stage is devoted to the characteristics of labor productivity of the Vologda Region economy as a whole. This section defines the Vologda Region's position

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[8] On labor productivity in the sectors of the Russian economy in comparison with other countries. Center for Macroeconomic Analysis and Short-term Forecasting. Available at: http://www.forecast.ru/_ARCHIVE/Analitics/PROM/2025/otr1.pdf

[9] Consumer price indices are taken for the sectors of agriculture, forestry, hunting, fishing and fish farming (except for the foreign economic activity "Forestry and logging").

in terms of this indicator among the regions of Russia[10] and the Northwestern Federal District. The following describes the dynamics of productivity in the period from 2017 to 2023, due to the availability and uniformity of statistical information. At the second stage of the study, attention is paid to the sectoral characteristics of labor productivity in the Vologda Region, its dynamics in the context of large-scale economic activities (TEA). For an in-depth analysis, activities such as "Agriculture, forestry, hunting, fishing and fish farming", "Manufacturing", "Transportation and storage" are broken down into smaller industries. At the third stage, industries with untapped potential for increasing labor productivity are identified. Special attention is paid to the branches of specialization of the Vologda Region. The localization coefficient was used as an indicator for their determination. It is estimated by comparing the share of the industry in the economy of the region and the country based on data on the average number of employees.

Inheritance has several limitations. The paper did not analyze labor productivity in "low-market" groups of industries, which, according to the CMASF study, include public administration, education, and activities in the field of health and social services, where measuring productivity requires the use of specific parameters. Another limitation is the strong aggregation of a number of industries (food production, metallurgical and chemical production, wood processing and the production of wood and cork products). They include foreign economic activity, which are specializations of the Vologda Region economy, and additional calculations have been carried out for them based on data on shipments and the average number of employees.

The information base of the study consists of data from the System of National Accounts, information on the average annual number of people employed in the economy (indicator 58994), the average number of employees (indicator 58699) and the volume of shipped products (indicator 57711) of the Unified Interdepartmental Information and Statistical System (EMISS) and the Federal State Statistics Service, including its territorial division in the Vologda Region.

Research results

Labor productivity in the Vologda Region economy. The Vologda Region occupies a relatively high position among Russian regions in terms of labor productivity. This is indicated by the value of the calculated indicator, the value of which in 2023 in the Vologda Region reached 2149.7 thousand rubles per year per employee (23rd place in the country).

Figure 1 shows the Vologda Region's position among 10 leading regions and 10 outsider regions. For instance, there is a significant lag behind the leader in terms of labor productivity, the Nenets Autonomous Area, where labor productivity reaches 16.3 million rubles per employee per year. In other words, the difference is almost 8 times. In addition, the Vologda Region is significantly inferior to the Yamal-Nenets, Khanty-Mansi and Chukotka autonomous areas, the Sakhalin Region and the Republic of Sakha (Yakutia). At the same time, the Vologda Region is ahead of 67 constituent entities of the Russian Federation, especially the regions of the Southern and North Caucasian federal districts (the excess reaches several hundred percent).

The Vologda Region occupies an average position among the regions of the Northwestern Federal District in terms of labor productivity *(Fig. 2)*. Behind the Murmansk Region, Saint Petersburg and the Republic of Karelia, it is ahead of the other six constituent entities.

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[10] The analysis considered 85 constituent entities of the Russian Federation without taking into account statistical information on the Donetsk People's Republic, the Lugansk People's Republic, the Zaporozhye and Kherson regions, due to restrictions on access to the necessary data.

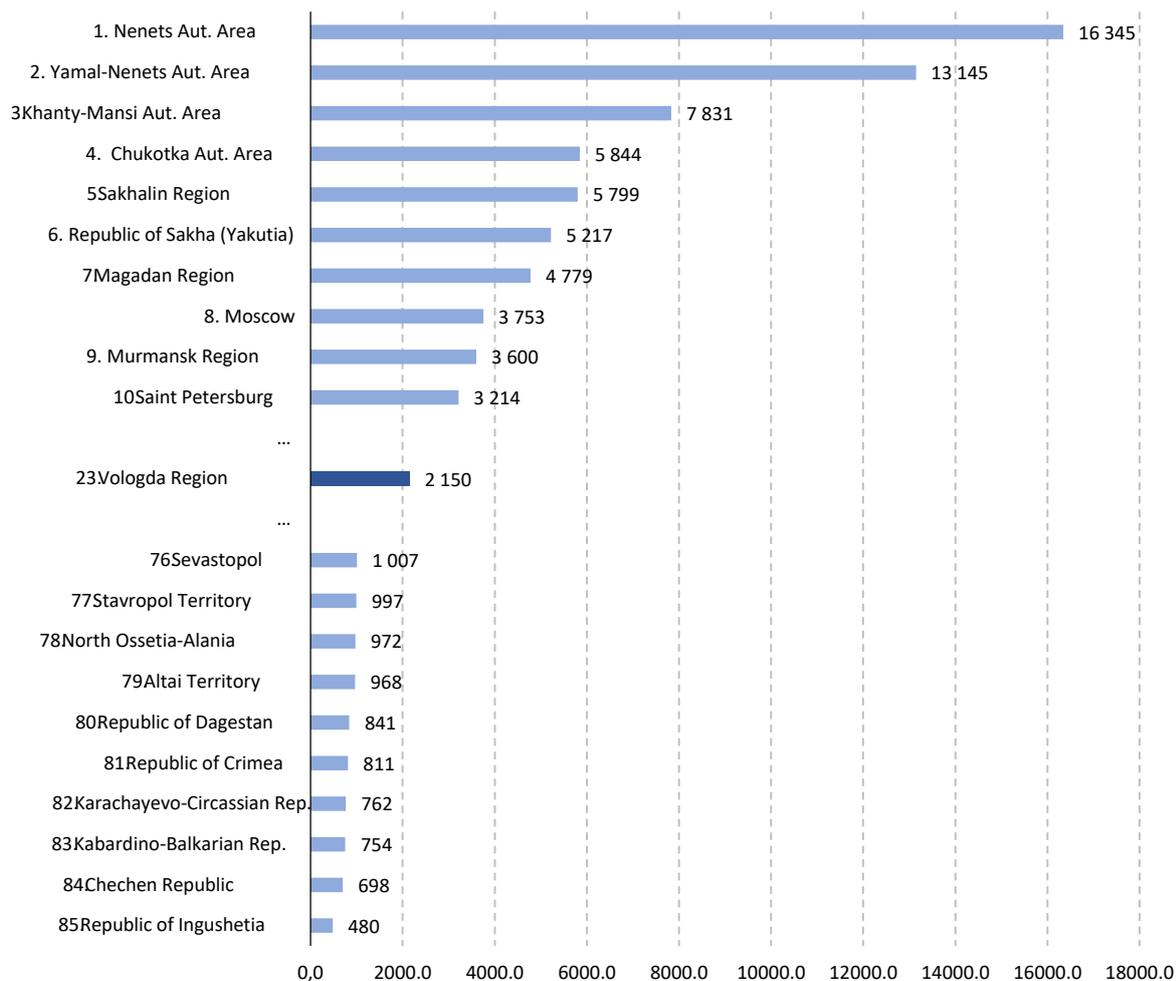**Figure 1. Labor productivity in the regions of Russia in 2023, thousand rubles per employee**
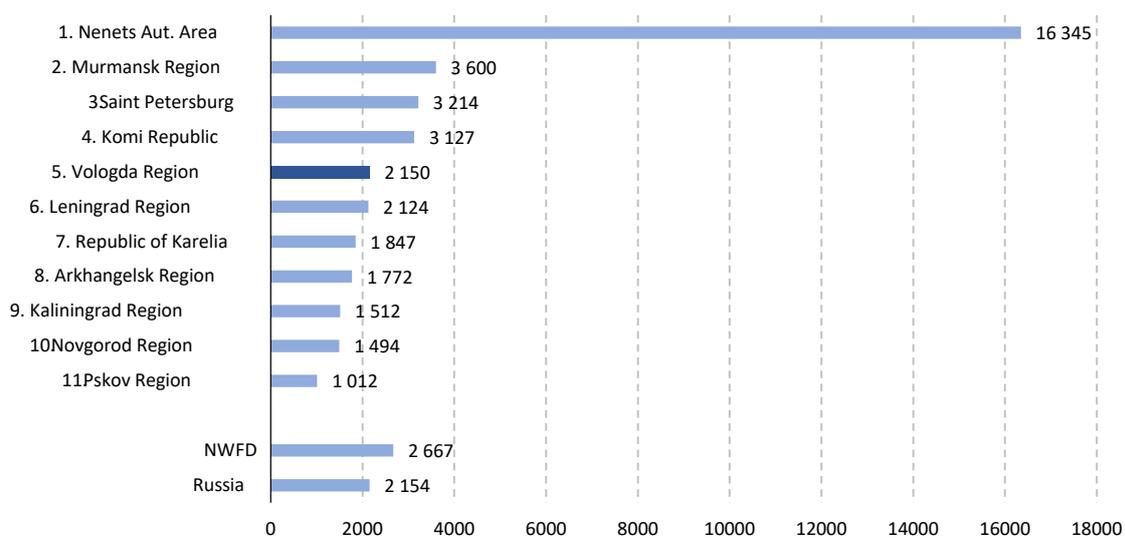According to: EMISS data.

Figure 2. Labor productivity in the regions of the NWFD in 2023, thousand rubles per employee
According to: EMISS data.

The region's labor productivity is characterized by uneven dynamics *(Fig. 3)*. A gradual increase is noted up to 2019, followed by two decreases in 2020 and 2022. They are characterized by a drop in GVA due to the COVID-19 pandemic and the effect of sanctions restrictions, which affected the decline in labor productivity in general.

A feature of labor productivity in the Vologda Region is its proximity to the average Russian level, rather than the average for the NWFD. In 2023, the value of the indicator in the region was only 80.6% of the district average, while in

relation to the country it reaches almost 100% *(Fig. 4)*. At the same time, the dynamics in both cases are close, the trends are almost the same – until 2019, there was a gradual increase in the indicator, in the next three years – decrease, followed by an increase in values.

Thus, the Vologda Region is characterized by a relatively high position in labor productivity among Russia's regions and the average in the NWFD, yielding primarily to the autonomous areas and Siberian regions. This position of the region among other regions is determined by the sectoral structure of its economy.
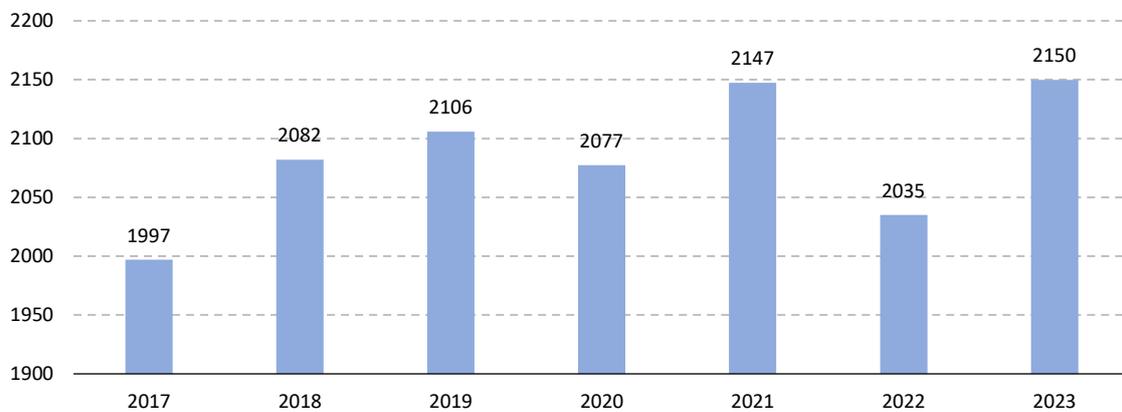

Figure 3. Labor productivity dynamics in the Vologda Region in 2017–2023 (in 2023 prices), thousand rubles per employee
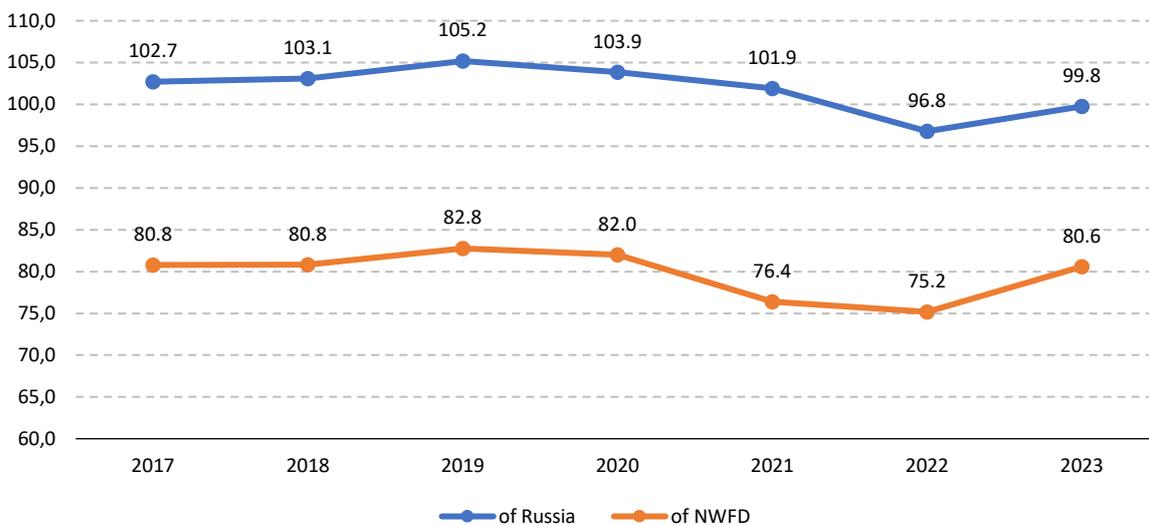According to: EMISS data.

Figure 4. Vologda Region labor productivity, % of the average level of Russia and the NWFD
According to: EMISS data.

Dynamics of productivity in economic sectors. In the context of industries, there are trends similar to the general dynamics of the region's economy. In the period from 2017 to 2023, labor productivity increased by 7.6% on average across industries *(Tab. 1)*. The increase occurred in most groups, with the maximum occurring in hotels and catering enterprises (+67%), agriculture, forestry, hunting, fishing and fish farming (+65.1%). Financial, insurance, and information activities also show good results (+44.5% and +32%, respectively). The largest decrease is typical for construction and administrative activities (-30.2 and -15.8%, respectively), which is due to a drop in GVA in the first case and a decrease in gross value with a simultaneous increase in the number of employees in the second.

In the group of branches of agriculture and forestry, hunting, fishing and fish farming, there is also an increase in labor productivity within the boundaries of the study period. The crop and livestock industry shows the best result (an increase of 1.9 times; *Tab. 2*). In the manufacturing industry, the dynamics is more uneven, but the trends are generally positive – a decrease in the indicator is observed in five out of 22 industries. Two industries stand out the most: the production of computers, electronic and optical products – in a positive way, the production of furniture is in the negative. In the first case, the indicator increased almost sevenfold, in the second it decreased by half, due to a significant reduction in the GVA generated by the industry. In the transportation and storage sectors, only one of the five industries

Table 1. Labor productivity in the sectors of the Vologda Region economy (in 2023 prices), thousand rubles per employee

Type of economic activity	2017	2023	2023 to 2017, %
Total by the surveyed types of economic activity	1,997	2,150	107.6
Activities of hotels and catering establishments	422	705	167.0
Agriculture, forestry, hunting, fishing and fish farming	787	1,300	165.1
Financial and insurance activities	298	431	144.5
Information and communication activities	1,394	1,841	132.0
Professional, scientific and technical activities	1,414	1,775	125.5
Wholesale and retail trade; repair of motor vehicles and motorcycles	802	963	120.1
Education	664	748	112.6
Water supply; sanitation, waste collection and disposal, pollution control activities	1,149	1,274	110.9
Provision of other types of services	423	454	107.4
Health and social services activities	898	949	105.6
Mining operations	1,234	1,278	103.6
Provision of electric energy, gas and steam; air conditioning	1,137	1,168	102.8
Public administration and military security; social security	1,688	1,733	102.7
Real estate operations activities	6,448	6,615	102.6
Activities in the field of culture, sports, leisure and entertainment	1,322	1,308	98.9
Manufacturing industries	5,579	5,504	98.7
Transportation and storage	1,892	1,824	96.4
Administrative activities and related additional services	1,134	955	84.2
Building	1,384	966	69.8
According to: Rosstat data.			

**Table 2. Ratio of the volume of goods shipped to the number of employed
in the Vologda Region (in 2023 prices), thousand rubles per employee**

Type of economic activity	2017	2023	2023 to 2017, %
Agriculture, forestry, hunting, fishing and fish farming			
Crop and animal husbandry, hunting	1,120	2,117	189.0
Fishing and fish farming	603	961	159.2
Forestry and logging	1,106	1,150	104.0
Manufacturing industry			
Manufacture of computers, electronic and optical products	1,900	13,153	692.3
Textile production	695	2,025	291.6
Production of electrical equipment	1,542	4,120	267.1
Production of paper and paper products	2,355	5,205	221.0
Printing and copying of information media	599	1,284	214.4
Manufacture of machinery and equipment not included in other groupings	1,600	2,910	181.9
Clothing production	225	393	175.2
Production of rubber and plastic products	3,892	6,779	174.2
Production of medicines and materials used for medical purposes and veterinary medicine	250	408	163.6
Production of other non-metallic mineral products	4,363	7,098	162.7
Manufacture of motor vehicles, trailers and semi-trailers	5,169	7,844	151.7
Wood processing and manufacture of wood and cork products, except furniture, manufacture of straw products and materials for weaving	1,550	2,151	138.8
Manufacture of other vehicles and equipment	2,093	2,694	128.7
Repair and installation of machinery and equipment	1,333	1,706	128.0
Manufacture of other finished products	732	894	122.2
Food production	3,731	4,540	121.7
Production of finished metal products, except machinery and equipment	5,909	6,210	105.1
Metallurgical production	24,791	24,746	99.8
Manufacture of leather and leather products	165	162	98.1
Production of chemicals and chemical products	43,016	39,119	90.9
Beverage production	5,475	4,464	81.5
Furniture manufacturing	1,368	675	49.4
Production of coke and petroleum products	no data	113,696	-
Transportation and storage			
Water transport activities	1,631	1,749	107.3
Land and pipeline transport activities	1,893	1,824	96.4
Warehousing and auxiliary transportation activities	9,824	8,193	83.4
Postal and courier activities	2,925	2,118	72.4
Air and space transport activities	1,028	344	33.5

Note: The indicator is calculated by dividing the volume of shipped products by the number of people employed in the relevant industries.
According to: EMISS data.

is characterized by positive dynamics – the activity of water transport (+7.3%). The largest decline is observed in the activities of air and space transport, where the ratio of shipments to the number of employees decreased by 66.5%.

Industry characteristics of the ratio of shipments to the number of employees. A more detailed study of labor productivity in the Vologda Region within groups of economic sectors allows identifying a number of their

features and determining reserves for productivity improvement. To compare industries of varying degrees of aggregation, consider the ratio of shipments to the number of employees *(Tab. 3)*. The first positions in terms of the indicator are occupied by foreign economic activity, which is part of the manufacturing industry. The leader is the production of coke and petroleum products. In 2023, this industry became the most productive in the industrial sector in the whole country, with large companies making the greatest contribution,

according to research by the National Research University of Higher School of Economics[11]. One of the sub-sectors, coke production, is one of the specializations of the Vologda Region. The value of the parameter in it is 113.7 million rubles per employee, 46% higher than the national figure, but 16% lower than the average for the NWFD. The lag of the Vologda Region from the regions that specialize in the production of coke and petroleum products and are characterized by the highest labor productivity in this area reaches 64%.

Table 3. Ratio of the volume of goods shipped to the number of employed in the Vologda Region in 2023 relative to the industry average, %

Type of economic activity	From the industry average in the NWFD	From the industry average in the RF	From the industry average to the top 3 regions*	For reference: localization coefficient **
Agriculture, forestry, hunting, fishing and fish farming:	70	134	32	1.07
Crop and animal husbandry, hunting and related services in these areas	116	183	68	0.60
Forestry and logging	113	187	68	5.86
Logging***	126	182	85	5.43
Fishing and fish farming	9	19	7	0.56
Mining operations	5	5	1	0.05
Manufacturing industries:	138	175	67	1.41
Food production	74	93	38	1.11
Production of dairy products ***	113	97	44	2.49
Beverage production	67	74	24	0.79
Textile production	58	74	33	0.50
Clothing production	37	54	24	0.33
Manufacture of leather and leather products	13	10	3	0.29
Wood processing and manufacture of wood and cork products, except furniture, manufacture of straw products and materials for weaving	98	151	49	5.20
Production of paper and paper products	47	60	33	1.90
Production of pulp, wood pulp, paper and cardboard***	64	67	38	3.21
Printing and copying of information media	22	44	10	0.43
Production of coke and petroleum products	84	146	36	0.09
Production of chemicals and chemical products	192	298	46	2.12
Production of basic chemicals, fertilizers and nitrogen compounds, plastics and synthetic rubber in primary forms***	143	352	165	1.97

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[11] The role of large companies in increasing labor productivity is assessed. Prime. Available at: https://1prime.ru/20241115/proizvoditelnost-852855997.html

End of the table

Type of economic activity	From the industry average in the NWFD	From the industry average in the RF	From the industry average to the top 3 regions*	For reference: localization coefficient **
Production of medicines and materials used for medical purposes and veterinary medicine	5	4	1	0.04
Production of rubber and plastic products	111	123	67	0.36
Production of other non-metallic mineral products	145	149	80	0.79
Metallurgical production	85	136	49	6.34
Production of cast iron, steel and ferroalloys***	110	138	87	12.04
Production of finished metal products, except machinery and equipment	155	132	78	1.07
Manufacture of computers, electronic and optical products	274	278	122	0.14
Production of electrical equipment	71	72	44	0.22
Manufacture of machinery and equipment not included in other groupings	61	66	40	1.06
Manufacture of motor vehicles, trailers and semi-trailers	313	137	29	0.36
Manufacture of other vehicles and equipment	55	60	24	0.10
Furniture manufacturing	50	61	19	0.94
Manufacture of other finished products	31	33	13	0.96
Repair and installation of machinery and equipment	60	71	26	1.34
Provision of electric energy, gas and steam; air conditioning	55	58	31	1.50
Water supply; sanitation, waste collection and disposal, pollution control activities	80	84	40	1.05
Building	137	153	38	0.74
Wholesale and retail trade; repair of motor vehicles and motorcycles	39	133	40	0.90
Transportation and storage	44	58	25	1.17
Activities of hotels and catering establishments	77	104	35	0.71
Information and communication activities	63	54	41	0.78
Real estate operations activities	40	56	28	0.80
Professional, scientific and technical activities	42	38	20	0.71
Administrative activities and related additional services	65	66	30	0.81
Activities in the field of culture, sports, leisure and entertainment	54	70	30	0.91
Provision of other types of services	56	85	43	0.77

* The average level of the indicator for the three leading regions in the industry. The calculation was carried out for regions with a localization coefficient greater than 0.5.
** The localization coefficient characterizes the degree of specialization of a region in economic sectors. The presence of specialization is indicated by a coefficient value greater than 1.
*** The indicator is calculated on the basis of data on the volume of products shipped and the average number of employees due to the lack of statistical information on employment for industries of this level of segregation.
According to: EMISS and Rosstat data.

The chemical complex is characterized by a high level of productivity. It accounts for 39 million rubles per employee, which is almost twice as high as the average for the NWFD regions, and three times as high for the whole country. The Vologda Region occupies the second position among the constituent entities of the Russian Federation in this indicator, second only to the Tyumen Region. The region has achieved even greater results in the production of basic chemicals and fertilizers, which is mainly due to the activities of a large enterprise of PJSC PhosAgro, which demonstrates high rates of labor productivity growth. The ratio of the volume of goods shipped to the number of employed people in the industry is 63.3 million rubles, which puts the Vologda Region in first place among the regions.

The chemical complex is followed by metallurgy. The ratio of shipments to the number of people employed here is 24.7 million rubles, and the region ranks third. The indicator of labor productivity in metallurgy in the Vologda Region as a whole is ahead of the national level, but inferior to the average in the Northwest. This is due to the structure of the complex – the Vologda Region specializes in ferrous metallurgy, namely in the production of cast iron, steel and ferroalloys, where the figure is 2 million rubles more than in the metallurgy of the Vologda Region as a whole. The positions in the rating among the subjects of the Russian Federation remain the same, but the gap from the leaders is significantly smaller (13% vs 51%). Another example of specialty industries that perform better than the sectors they belong to is the production of dairy products, pulp, and wood pulp, to a lesser extent logging. This is mainly reflected in their proximity to the leading regions.

The fourth place is occupied by the production of computers, electronic and optical products. Despite the fact that this group is not one of the branches of specialization of the Vologda Region, the indicator level in it is higher not only in comparison with the national one, but also the average for the district and the leading regions. This is due to the increase in the production of optical products in recent years due to the needs of the military-industrial complex.

The minimum values of the shipment-to-employment ratio are characterized by industries producing leather goods, clothing, and medicines, as well as a group providing other types of services. In the first sector, the gap from the leading sector in the Vologda Region reaches 702 times. The gap from the average level in the Northwestern Federal District and the country as a whole is also large (87.2 and 89.9%, respectively). In the manufacture of medicines, the deviation in all parameters is even greater. The indicator is ten times lower than in the regions that have achieved maximum results in this industry. A slightly better situation is observed in the production of clothing, the calculated parameter here is inferior to the average for the district and the country by 63.4 and 46.3%, respectively.

When analyzing industries with reserves for increasing labor productivity, it is worth paying special attention to large sectors of the economy, which at the same time are characterized by a relatively low level of productivity compared to the regional average. Based on the parameter of the employed population, in the Vologda Region, these groups include wholesale and retail trade, transportation and storage, as well as wood processing. In total, they account for 32.8% of the total number of employees, while the share in shipments is only 12%. An increase in labor productivity in these sectors to the regional average level can be achieved by reducing the number of people employed in them while maintaining the current volume of GVA. This can lead to the release of 104.5 thousand people (20.8% of the number of people employed in the economy), who can become a potential source to cover the shortage of personnel in the region. In this case, additional training or retraining of employees will be required for their cross-industry flows.

Conclusion

Within the framework of the presented research, a methodological approach has been tested to determine the sectoral reserves for increasing labor productivity at the regional level. Based on the materials of the Vologda Region, an indicator has been calculated representing the ratio of GVA to the number of employed in the economy as a whole and in the context of industries. His analysis pointed to the uneven dynamics of the parameter due to its sensitivity to crises, and also made it possible to characterize the Vologda Region's position on this indicator as high among the country's regions and average at the level of Northwestern Russia. This situation is due to the sectoral structure of the region's economy with a significant contribution from capital-intensive high-performance sectors.

In the sectoral analysis, an indicator similar to the level of labor productivity was used to characterize the transportation and storage groups, the manufacturing industry, as well as agriculture, forestry, hunting, fishing and fish farming. It is calculated by dividing the volume of shipped products by the number of employed people. The industries characterized by the highest value of this parameter include the production of coke, basic chemicals and fertilizers, cast iron, steel and ferroalloys, as well as the manufacture of computer, electronic and optical products. They are ahead of the average for the Northwestern Federal District levels of indicators in the relevant industries and, to an even greater extent, the average for the country as a whole. At the same time, a comparison with the values achieved in the leading regions indicates that there is also growth potential in these industries. The exception is the production of basic chemicals and fertilizers, for which the region ranks first.

The study concluded that the key sectors with reserves for increasing labor productivity are characterized by a reduced value of the shipment-to-employment ratio compared to the regional average, with a high share in the employment structure. These include transportation and storage, wholesale and retail trade, and wood processing. Productivity growth in them can be achieved through modernization of warehouse logistics, digitalization, deepening the processing of raw materials and the development of other areas. The result may be the release of personnel for their intersectoral flows as a way to solve the problem of a shortage of workers in the sectors of the region's economy. The industries producing leather goods, clothing and medicines also have reserves in the group of providing other types of services. The key factor holding back the growth of labor productivity in them is the lack of resources, especially financial ones. It is caused by the lack of own funds from enterprises and difficulties in attracting investors (Simachev et al., 2020), as well as high credit risks.

The scientific novelty of the research consists in the proposal of an approach to identify industries that have reserves for increasing labor productivity, and its testing on the materials of the Vologda Region. The results can be used by regional authorities in the development of strategic documents, as well as to substantiate economic policy directions.

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