



Evaluating the Current Situation and Trends in the Labor Market of the “Periphery” Industries of the Digital Economy: Comparative Analysis of Open Data on Vacancies and Statistical Data

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Abstract

The research aims to study the labor market of the Russian Federation in industries related to the development of the digital economy—the “periphery.” During the research, the authors assessed the current situation in the labor market in Russia and discovered a link between labor market indicators and the share of enterprises operating in the digital economy on the “periphery.” As the main trend of economic development, digitalization affects the processes associated with labor resources. This research is based on the results obtained during the implementation of a grant from the Russian Science Foundation provided to the authors. The methodological basis of the research is presented by general scientific methods and methods of economic and mathematical modeling. The main problem of the labor market in 2023 is the shortage of labor resources. Dividing the sectors of the digital economy into the “core” and “periphery,” attention is paid to the industries of the second level of digitalization. According to the results, changes in the “periphery” of the digital economy are accompanied by changes in the labor market. To study the “core” level of the digital economy and assess its relationship with the

labor market, statistical indicators are required that differ from those used in the research. The research shows that the “periphery” of the digital economy is characterized by low values of labor market indicators.

Keywords

Digitalization · Economic sectors · “Core” of the digital economy · “Periphery” of the digital economy · Labor market

JEL Codes

J20 · O30 · O33

1 Introduction

The study of labor resources is an important and relevant area for any country or region because it allows us to assess and optimize the use of available labor resources. In turn, it helps make informed decisions in economics, demography, education, and politics.

Today’s economy is developing under the influence of digital processes and technologies. The introduction of digital technologies in various areas of economic activity improves the production and economic activities of the organization (Sozinova et al. 2023a; Tolmachev et al. 2023). Additionally, digitalization supports socially sustainable development by creating new jobs and improving the standard of living for the population.

The introduction of digital technologies into the work of organizations divides economic activities into two categories: the “core” of the digital economy (industries with a high degree of digitalization) and the “periphery” of the digital economy (industries with a low level of digitalization).

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The labor market is closely linked to the development of the economy. Therefore, there must be a certain relationship between labor market indicators and the number of organizations belonging to the “periphery” of the digital economy within the framework of specific types of economic activity, which is the main hypothesis of this research.

The research aims to test the hypothesis and analyze the Russian labor market in 2023.

2 Methodology

The study of the digital economy covers a specific niche in scientific research. Various aspects of its development are highlighted in the works of such researchers as Ashmarina et al. (2023), Denisov et al. (2023), Golovenchik (2019), Gorokhovitskaya et al. (2022), Kotandzhyan (2023), Kudryavtseva and Kozhina (2021), Popov and Semyachkov (2017), Sozinova et al. (2023c).

The study of the “core” and “periphery” of the digital economy is popularized in the scientific works of Belousov and Timofeeva (2019), Chukov and Zolotov (2021), Siqueira and Fontenelle (2023), Sozinova et al. (2023b), Zolotov (2022).

The information base of the research includes the work “Modeling and factor forecasting of labor resources in the periphery of the digital economy” (Sozinova 2023–2024) carried out by the authors. Moreover, the research considers statistical information presented on the official statistics portals of the Federal State Statistics Service of the Russian

Federation (Rosstat) and the Unified Interdepartmental Information and Statistical System (EMISS) (EMISS n.d.; Rosstat n.d.).

The authors analyzed each type of economic activity considering three levels of the digital economy: core, semi-periphery, and periphery. The authors determined the shares of organizations in each level of the digital economy for each type of activity. The industries were studied by analyzing tokens characterizing the job description of the enterprise. The research studies the sectors of the periphery of the digital economy that are of interest (i.e., the sectors of the economy dominated by organizations with an increased level of non-digital requirements for applicants). The share of organizations at the “core” of the digital economy in such industries is less than 34%.

Within the framework of the grant for 2023, considering the results obtained, the authors identified the economic activities related to the “periphery” of the digital economy. These types include sections E, I, L, O, P, and R, the names of which are contained in the All-Russian Classifier of Types of Economic Activity (Rosstandart 2014).

Figure 1 shows the share of organizations in the “core” and “periphery” of the digital economy by selected types of economic activity.

Following the hypothesis of this research, the authors consider statistical data concerning the work of organizations in the selected sectors of the economy. The following indicators of the organization’s performance indicators were established and categorized by different sectors of the economy:

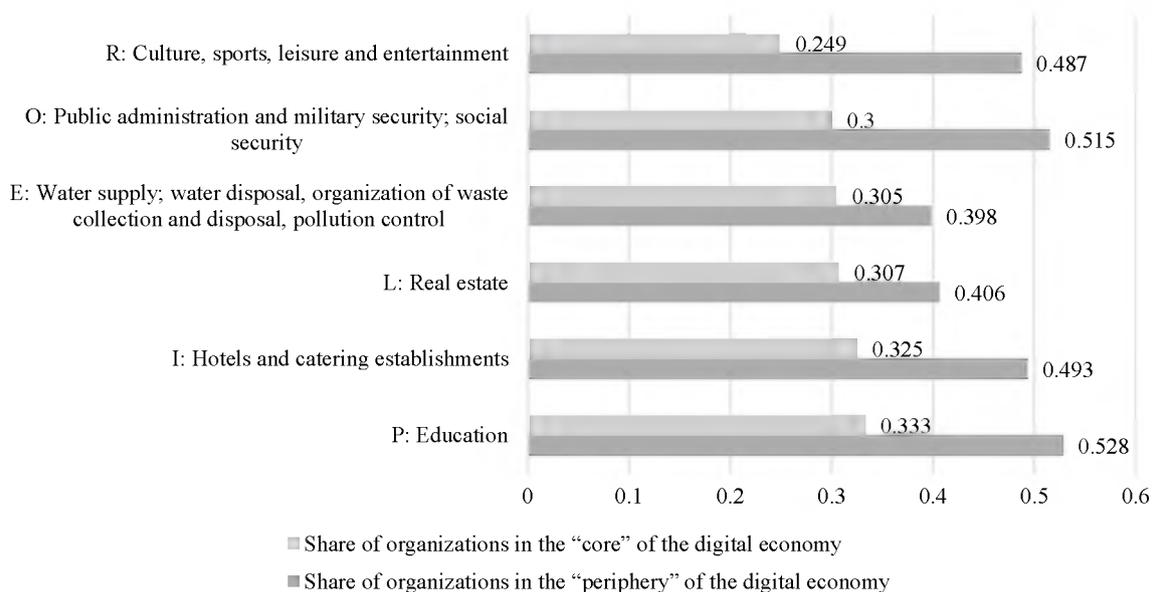


Fig. 1 The ratio of organizations operating in the core and periphery of the digital economy within certain types of economic activity.

Source Compiled by the authors

- Turnover of organizations (billion rubles) (x_1);
- Structure of the employed population at their main job (%) (x_2);
- The number of hired (x_3) and retired employees (x_4) (people);
- Average monthly nominal accrued wages of employees of organizations (rubles) (x_5).

The methodological basis of this research is represented by methods such as observation, analysis, synthesis, generalization, grouping, and economic and mathematical modeling.

3 Results

In 2023, a historical minimum unemployment rate was recorded in Russia (2.9%). Simultaneously, analysts predict an increase in unemployment due to the reduced foreign investment in the real sector, a deterioration in domestic and external demand for goods and services, and the impact of digitalization and automation of production. One of the negative sides of the low unemployment rate is the appearance of a shortage of labor resources (Kolobova and Gadzhieva 2024).

According to the 2023 labor market survey prepared by HeadHunter, Russia's largest Internet recruitment company, the average number of active resumes exceeded the number of vacancies offered by employers from January to April 2023. This led to a situation where the demand for labor exceeded the supply in the labor market. Since May 2023, the situation has been changing dramatically, which has led to the formation of a shortage of labor resources. At the end of the year, there was a serious shortage of personnel in industries such as retail, transport, healthcare, and manufacturing (HeadHunter 2023b). The internal (corporate) reasons are the non-competitive salary level and insufficient development (or lack) of the employer brand. The heads of organizations point to the following external factors that lead to a shortage of labor resources:

- The events that occurred as a result of geopolitical tensions;
- The lack of specialists with the required skills;
- A difficult demographic situation.

An extremely high level of competition among applicants was observed in the fields of culture and entertainment, investment and consulting, and management (HeadHunter 2023a).

According to an analytical review by the SuperJob research center, the number of job vacancies in 2023 increased by more than 1.5 times, while the number of employee resumes decreased, with 85% of organizations

reporting a shortage of personnel. The Russian labor market has been experiencing an "aging" workforce for several years, largely due to a demographic gap. Addressing this issue and rejuvenating the workforce can be achieved by implementing youth-focused policies within organizations and engaging with young, skilled professionals (SuperJob 2023).

The "periphery" of the digital economy includes sectors within which organizations posting vacancies on the recruiting platform HeadHunter (n.d.) post mainly non-digital requirements for future labor resources or skills containing characteristics of using digital technologies for interaction with market entities. In turn, the latter refers to standard office programs and work on the Internet.

During this study, the authors used statistical data ranking to determine the state of the labor market and compare it with the level of digitalization of a certain type of economic activity. Since the authors study the "periphery" industries of the digital economy, the final rank of statistical indicators is compared with the rank of the periphery level. The ranking of the indicator value was carried out in ascending order. Thus, rank 1 refers to information and communication activities (the lowest) at the level of the "periphery" of the digital economy, and rank 16 refers to education (the highest) (Table 1).

According to the ranking in Table 1, the following pattern can be observed: the higher the share of organizations in the "periphery" of the digital economy, the lower the industry rank in terms of statistical labor indicators. In general, the industries of the "periphery" of the digital economy are dominated by low values of turnover of organizations and their income from labor, as well as the minimum number of employees who work in the main places of employment.

Table 2 presents statistical data on the above indicators, which are necessary for conducting correlation analysis.

Let us conduct a correlation analysis of the "periphery" of the digital economy with labor market indicators. The results are presented in Fig. 2.

Analyzing the data presented in Fig. 2, the authors draw several conclusions.

The relationship between the performance factor and the average monthly nominal accrued salary of workers in industries related to the "periphery" of the digital economy is direct and weak because the indicator value is less than 0.5.

In the context of studying the correlation between indicators of labor movement (x_3 and x_4) and the productive factor, the authors conclude that there is a connection in the direction and a strong statistical dependence. There is an increase in the "periphery" of the digital economy, which is reflected in an increase in the number of employed and retired workers. However, such a relationship needs to be studied not only with the help of statistical indicators but also with the help of sociological surveys that show the internal and

Table 1 Ranking of types of economic activity according to the performance indicators of organizations

OKVED	Rank of the share of organizations on the “periphery” of the digital economy	Statistical indicator rank					
		x ₁	x ₂	x ₃	x ₄	x ₅	Final rank
J	1	14	8	15	9	3	11
D	2	11	6	9	11	7	8
K	3	16	7	10	1	5	7
B	4	15	5	11	14	5	12
C	5	9	15	2	15	15	16
F	6	8	12	5	12	11	10
A	7	3	9	7	8	10	5
G	8	6	16	1	16	16	14
H	9	12	13	4	13	13	14
M	10	13	10	8	10	9	12
E	11	2	1	16	4	1	1
L	12	5	2	13	7	2	2
R	13	7	3	14	2	4	3
I	14	1	4	12	5	8	3
O	15	10	11	6	6	12	9
P	16	4	14	3	3	14	6

Source Compiled by the authors based on (EMISS [n.d.](#); Rosstandart 2014; Rosstat [n.d.](#))

Table 2 Information on the performance of organizations in the areas of economic activity related to the “periphery” of the digital economy

OKVED	x ₁	x ₂	x ₃	x ₄	x ₅
E	2072.1	0.7	127,190	129,984	52,185
L	4702.9	1.7	221,581	237,557	54,612
R	739.2	2.1	249,167	223,902	64,929
I	2385.2	2.7	260,673	291,441	43,192
O	3206.6	7	598,832	590,611	73,861
P	863.4	9.7	1,282,904	1,305,434	54,263

Source Compiled by the authors based on (EMISS [n.d.](#); Rosstandart 2014; Rosstat [n.d.](#))

external causes of the labor movement, which indicates that there is an open debatable issue for further research.

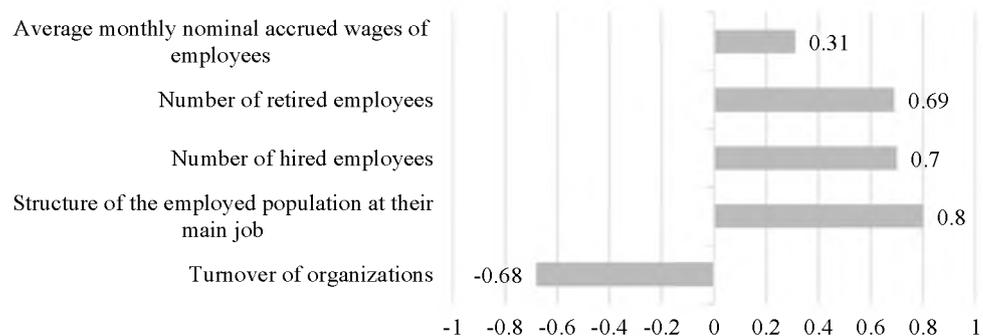
As a factor connected to the “periphery” of the digital economy, the turnover of industry organizations has a

feedback loop and a strong correlation with production factors. Specifically, a higher turnover in an economic sector is associated with a lower level of the “periphery” in the digital economy, meaning that industries with greater digital technology penetration tend to have lower turnover in peripheral sectors.

A study conducted by the authors revealed that the nature of the distribution of labor by industry of economic activity is closely correlated with the proportion of organizations operating in the field of the “periphery” of the digital economy. This connection is direct.

Thus, the research demonstrated the relationship between the industries of the “periphery” of the digital economy and labor market indicators in these industries. During the research, no correlation was found between the “core” of the digital economy and the selected indicators. Thus, a new debatable question arises about identifying other factors that may affect the Russian “core” of the digital economy.

Fig. 2 The assessment results of the relationship between the share of organizations belonging to the “periphery” of the digital economy and various factors.
Source Compiled by the authors



4 Conclusion

According to the conducted research, it became clear that changes in the digital economy lead to a shift of sectors of the Russian economy to the periphery. This process has an impact on the labor market, which confirms the initial hypothesis of this research. The Russian labor market needs to be given special attention, given the existing problems. To improve the situation, it is necessary to increase funding in the areas of wages, education, and development and retraining of the workforce. Additionally, it is important to ensure flexible working conditions and actively work to retain qualified specialists. These steps will help mitigate the negative effects of changes in the economy and create a more stable environment for developing the Russian labor market.

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Data Availability Data on statistical indicators of the Russian labor market for 2023, necessary for studying correlation dependence, are available at <https://figshare.com/> with the identifier <https://doi.org/10.6084/m9.figshare.25560177>.

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