



CAUSES AND CONSEQUENCES OF THE LABOR SHORTAGE IN RUSSIA: A MACROECONOMIC APPROACH

CAUSAS E CONSEQUÊNCIAS DA ESCASSEZ DE MÃO DE OBRA NA RÚSSIA: UMA ABORDAGEM MACROECONÔMICA

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ABSTRACT

Objective: This article examines the causes and macroeconomic consequences of labor shortages in Russia, comparing them with global trends and specifically focusing on the period from 2000 to 2023. The study aims to understand how these shortages impact the economy in terms of GDP production, personal income, and tax revenues.

Methods: Utilizing a case-study approach, the research analyzes labor shortages in Russia and compares them with the United States and Germany. It employs a mix of qualitative and quantitative methods, drawing data from the Federal State Statistics Service and international databases such as the OECD and World Bank. The study includes a comprehensive review of labor market trends and the application of theoretical models to analyze the impact of labor shortages on economic indicators.

Results: The study finds that Russia faces unique challenges compared to Western economies due to its demographic trends, economic structure, and policy environment. Unlike in the US and Germany, where increases in job vacancies tend to alleviate unemployment, Russia shows little correlation between job vacancies and unemployment rates, indicating deeper structural issues. The research highlights significant macroeconomic losses due to labor shortages, including underproduction of GDP, unrealized personal income, and reduced tax contributions to the national budget.

Conclusions: The study concludes that labor shortages in Russia are a critical barrier to economic growth, necessitating comprehensive policy responses. It recommends targeted measures to enhance workforce mobility, skill development, and incentives for labor market participation to address the mismatch between labor supply and demand.

Keywords: Aggregate labor market; Unemployment; Wage rigidity; Labor market imbalance; GDP losses; Income losses.





RESUMO

Objetivo: Este artigo examina as causas e consequências macroeconômicas da escassez de mão de obra na Rússia, comparando-as com tendências globais e focando especificamente no período de 2000 a 2023. O estudo visa entender como essas escassezes impactam a economia em termos de produção de PIB, renda pessoal e receitas tributárias.

Métodos: Utilizando uma abordagem de estudo de caso, a pesquisa analisa a escassez de mão de obra na Rússia e a compara com os Estados Unidos e a Alemanha. Emprega uma mistura de métodos qualitativos e quantitativos, utilizando dados do Serviço Federal de Estatísticas do Estado e bancos de dados internacionais como a OCDE e o Banco Mundial. O estudo inclui uma revisão abrangente das tendências do mercado de trabalho e a aplicação de modelos teóricos para analisar o impacto das escassezes de mão de obra nos indicadores econômicos.

Resultados: O estudo descobre que a Rússia enfrenta desafios únicos em comparação com as economias ocidentais devido às suas tendências demográficas, estrutura econômica e ambiente político. Ao contrário dos EUA e da Alemanha, onde aumentos nas vagas de emprego tendem a aliviar o desemprego, a Rússia mostra pouca correlação entre vagas de emprego e taxas de desemprego, indicando problemas estruturais mais profundos. A pesquisa destaca perdas macroeconômicas significativas devido à escassez de mão de obra, incluindo subprodução de PIB, renda pessoal não realizada e contribuições fiscais reduzidas ao orçamento nacional.

Conclusões: O estudo conclui que as escassezes de mão de obra na Rússia são uma barreira crítica ao crescimento econômico, necessitando de respostas políticas abrangentes. Recomenda medidas direcionadas para melhorar a mobilidade da força de trabalho, o desenvolvimento de habilidades e incentivos para a participação no mercado de trabalho para abordar o descompasso entre oferta e demanda de mão de obra.

Palavras-chave: Mercado de trabalho agregado; Desemprego; Rigidez salarial; Desequilíbrio do mercado de trabalho; Perdas do PIB; Perdas de renda.

1 INTRODUCTION

Labor shortages have become a pressing issue in developed and developing economies worldwide. Rapid industry transformation, technological advancement, an aging population, and shifting demographic trends have significantly impacted the global labor market. These factors have led to a growing mismatch between the demand for skilled workers and the available workforce. This imbalance threatens economic growth, disrupts productivity, and places pressure on wage structures. Countries like the United States, Germany, and Russia are experiencing these challenges in varying ways due to their unique economic and market dynamics.





Our research examines labor shortages in Russia, paying special attention to how these shortages interact with unemployment trends and impact macroeconomic indicators, such as GDP, household income, and tax revenue.

Many scholars recognize workforce shortages as a critical challenge (RBK, Jan. 5, 2024).

Numerous publications on this topic cover macro, meso, or micro levels. These aspects of labor shortages are interconnected and influence one another.

Studies note labor shortages at the level of individual companies (Kuznetsova et al., 2023; Matemani & Ndunguru, 2019; Mortikov, 2022). Other authors point to regional, sectoral, and national shortages (Chekmarev et al., 2023; Dembinskaya, n.d.; Fisher & Marciano, 1997; Winter et al., 2020). According to a survey conducted by the Superjob portal in 2023, 85% of Russian companies are experiencing workforce shortages (RBK, 2023).

In the Republic of Tatarstan, the largest shortages are observed in industry, construction, and the public sector, with a job tension ratio of 0.06 people/vacancy (RBK, Jul. 4, 2024).

Hysteresis is identified as a cause of labor shortages in specific labor market segments in (Layton, 1991). At the macro level, cyclical downturns lead to large-scale shifts of skilled workers from one industry to another (Mortikov, 2022).

Research estimates a 35% labor shortage in the Russian industry from 1996 to 2023. Many publications highlight the chronic shortage of professionals and a lack of required skills and competences (Blažič, 2021; Barnow et al., 2013; Chojnicki & Moullan, 2018; Gimpelson & Kapeliushnikov, 2018; Suray et al., 2019). The workforce shortage in some sectors (defense, agriculture, construction, IT, and extractive industries) is linked to a lack of labor and production expansion (Kolesnikova et al., 2023).

Some authors examine labor shortages in developed countries concerning the need to attract foreign labor (Biavaschi & Zimmermann, 2014; Dubovik & Suvorova, 2021; Vinokurov, 2022a).

Under sanctions and the exit of foreign companies from the Russian market, unemployment did not spike, although companies slowed hiring rates. Labor shortages increased, and wages in some sectors began to grow rapidly. To optimize labor costs amidst inflation, employers have started shifting employees to part-time schedules without increasing payment. Some companies address the shortage by recruiting prisoners and students and extending working hours.

Labor market experts describe a unique Russian labor market model. This model is





characterized by reduced working hours and lower labor costs in response to economic shocks, rather than decreased employment and increased unemployment. The most notable shifts include shorter working hours and rising wages. However, this trend may not continue given the severe labor shortage (Kapeliushnikov, 2023). In addition to salary, benefits are becoming important for employees: for engineering and technical roles, private health insurance is now a top priority, while for skilled workers, employer-sponsored meals are highly valued.

According to Superjob, salary delays and staff layoffs have nearly disappeared, with 98% of survey participants confirming this and 93% reporting no employee reductions (RBK, 2023).

Labor shortages arise when the demand for labor exceeds its supply. This imbalance in the labor market is highly uneven across the country and is determined by location, professional specialization, areas of greatest labor shortage, and quantitative measures (Kolesnikova et al., 2023). To quantify labor shortages, it is essential to identify their causes specifically and over specific time periods, categorizing them into demographic, socioeconomic, geographic, gender-based, and institutional factors. For instance, the retirement of employees with unique skills that are difficult to replace in a short time frame is noted (Heisler & Bandow, 2018).

To assess labor shortages quantitatively, it is necessary to identify their numerous causes based on a time period, dividing them into demographic, socioeconomic, territorial, gender, and institutional. For example, one cause is the retirement of employees with unique competences that are difficult to restore in a short period (Heisler & Bandow, 2018). At the organizational level, shortages may be attributed to a lack of motivation among personnel for unappealing work, challenging working conditions combined with relatively low pay, and limited prospects for professional and career advancement. A similar trend is observed in the migration of workers from less attractive or low-paying sectors to areas offering better working conditions (Kesternich et al., 2021).

Among the causes of labor shortages, scholars highlight the COVID-19 pandemic of 2020-2021 and the associated rise in mortality, the development of delivery services that absorbed part of the workforce, sanctions, the weakening ruble, which led to an outflow of migrants, import substitution, the strengthening of the defense industry, the creation of approximately 0.5 million new jobs in defense alone, the emigration of mostly young specialists in 2022-2023, and the demographic downturn of the 1990s. The study (Mortikov,





2022) emphasizes macroeconomic causes for organizational labor shortages, such as fiscal, monetary, and trade policies and capital flows.

Demographic factors, such as declining birth rates and an aging population, reduce the number of working-age individuals, negatively impacting the country's overall economic state (Maslova et al., 2022; Wie et al., 2018). A positive trend is the changing attitude of employers toward hiring seniors and women.

At the organizational level, labor shortages create a vicious circle: staff shortage – decline in performance – inability to pay employees competitive wages – staff shortage. Breaking out of this cycle and achieving staff retention and recruitment requires highly skilled and well-compensated specialists, making salary a decisive factor. However, the relationship between labor market imbalances and wage dynamics is not straightforward. The study (Vinokurov, 2022b) identifies significant deviations in Russia from the general trend of decreasing unemployment as wages rise from 1996 to 2017, demonstrating the undeniable impact of other factors.

Based on the material reviewed, the study addresses the following key questions:

- Why do labor shortages and unemployment coexist and persist in the modern market economy?
- At what level does labor shortage in Russia become a significant barrier to economic growth?
- What are the economic losses caused by labor shortages?

2 METHODS

We used a case-study approach to analyze labor shortages in Russia from 2000 to 2023, comparing them with labor market trends in the US and Germany over the same period. The case-study method enabled an in-depth examination of the unique characteristics of the Russian labor market and allowed for a comparative analysis with developed economies. The data were collected from sources including official statistics from the Federal State Statistics Service responsible for national statistics and international databases, such as the OECD and World Bank, and scientific articles indexed in citation databases like Web of Science and Scopus.

To study the causes of unemployment and labor shortages, we considered the neoclassical model of the aggregate labor market (Figure 1).



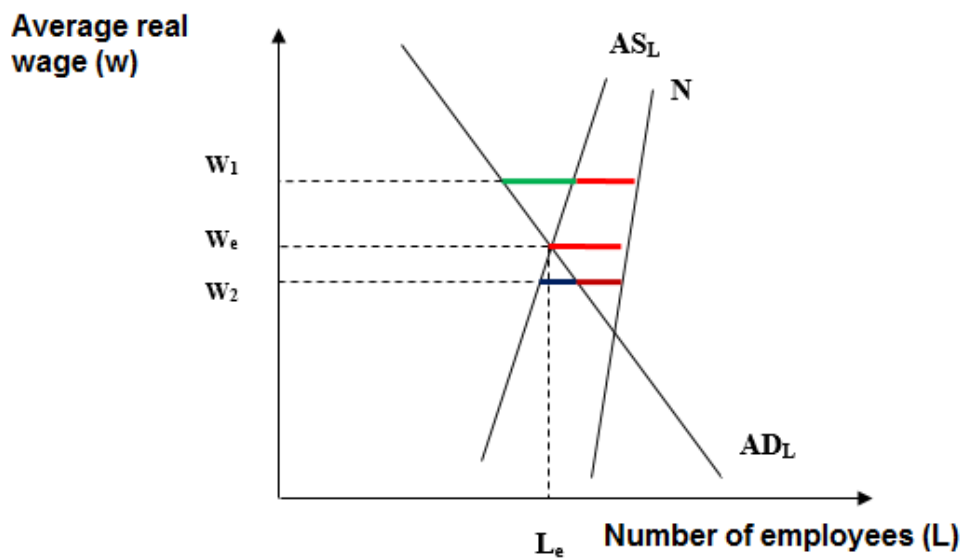


Figure 1. Uneven unemployment and labor shortage in the aggregate labor market

In this model:

- AD_L represents the aggregate demand curve for labor. We calculated labor demand as the sum of the number of employed individuals and job vacancies.
- AS_L represents the aggregate labor supply curve. We calculated labor supply as the workforce minus those who left voluntarily, thus representing labor supply as employed and unemployed people actively seeking work and willing to accept the offered wage level.
- N is the curve representing the labor force as recorded in official statistics by total workforce size.

In equilibrium in the aggregate labor market, where $AD_L = AS_L$, employment reaches L_e , and the average real wage is w_e . However, even under equilibrium conditions, natural unemployment exists represented in the model by red segments.

When wages exceed the equilibrium level (w_1), disequilibrium unemployment arises marked by green segments.

Historically, the debate on wage effects on unemployment levels originated from J.M. Keynes' argument in his classic work "The General Theory of Employment, Interest, and Money" (Keynes, 1936). Keynes challenged A. Pigou's assertion in "The Theory of Unemployment" (Pigou, 1933) that unemployment is due to excessively high wage demands from employees.

When wages fall below the equilibrium level (w_2), a labor shortage emerges (represented by the blue segment). Under various impacts, labor demand and supply



constantly shift, establishing a new equilibrium wage level. In a modern market economy, real wages are typically inflexible, meaning they cannot quickly and adequately respond to shifts in labor demand and/or supply. This model suggests that the persistent labor shortage is due to an increase in labor demand and/or a reduction in labor supply amid wage inflexibility.

The aggregate labor market model highlights key areas for analyzing the growing labor shortage in the Russian economy:

- Changes in labor demand.
- Changes in labor supply.
- Wage rigidity in upward adjustments.

A certain level of unemployment can positively impact the economy by creating a labor reserve for employers and encouraging productivity growth. Similarly, a certain level of labor shortage serves as a job reserve for employees while prompting employers to adopt labor-saving technologies. However, when unemployment and labor shortages exceed certain thresholds, they negatively affect actual and potential economic growth. To assess the risk level of labor shortages in the Russian economy, we employed an integral vacancy provision coefficient (1):

$$d_L = \frac{U}{V_L} \quad (1)$$

where:

d_L is an integral coefficient of vacancy provision,

U is the number of unemployed individuals,

V_L is the number of vacancies.

This coefficient reflects the flexibility of the aggregate labor market, indicating its potential capacity to address labor shortages. If the value exceeds 2, the labor shortage is manageable for the economy; if it falls below 2, labor shortages become a significant barrier to economic growth.

The severity of the labor shortage is evidenced by the dynamics of economic losses due to the underutilization of the labor force. This study assesses losses in terms of:

- GDP underproduction,
- Foregone household income,
- Unpaid taxes to the national budget.





The analysis of labor shortages and their effects is based on available statistical data from the Federal State Statistics Service, specifically examining the number of required employees for vacant positions at the end of the year.

To estimate GDP underproduction due to unfilled job vacancies, we considered it appropriate to use GDP at current prices. This choice is justified by the fact that annual losses are represented as *a percentage of the GDP shortfall relative to the actual GDP produced* (2):

$$y_v = \frac{Y_E \times V_L}{Y_n} \times 100 \quad (2)$$

where:

y_v is the GDP shortfall as a percentage of the actual GDP produced,

Y_E is GDP/employed person, in million rubles, calculated as GDP at current prices divided by the number of employed people,

V_L is the number of required employees for vacant positions at the end of the year, thousands,

Y_n is GDP at current prices, billion rubles.

Lost household income was calculated based on the average annual gross wage/employee that was unrealized due to unfilled job vacancies. To ensure comparability of income loss dynamics over the years, the indicator of *lost wages was calculated as a percentage of the total wage bill for employed people* (3):

$$w_v = \frac{w_E \times V_L}{W_y} \times 100 \quad (3)$$

where:

w_v is lost wages as a percentage of the total wage bill for employed people,

w_E is the average annual gross wage/employee, thousand rubles,

V_L is the number of required employees for vacant positions at the end of the year, thousands,

W_y is the wage bill for employed people as a portion of GDP by income sources, billion rubles.

To estimate unpaid taxes and contributions, we used available data from the Federal State Statistics Service on the revenues of extrabudgetary funds and the consolidated (not





federal) budget as income taxes are allocated to regional budgets. The shortfall was caused by two main channels:

- Unpaid employer contributions to social extrabudgetary funds estimated at an average rate of 30% of wages.
- Unpaid income tax calculated at 13% of gross wages.

To ensure comparability of the level and dynamics of unpaid taxes and contributions, we calculated an indicator for *unpaid social contributions and income taxes as a percentage of the revenues of the consolidated budget and extrabudgetary funds* (4):

$$t_v = \frac{0.3(w_E \times V_L) + 0.13(w_E \times V_L)}{R_b} \times 100 = \frac{0.43(w_E \times V_L)}{R_b} \times 100 \quad (4)$$

where:

- t_v is unpaid social security contributions and income taxes as a percentage of the revenues of the consolidated budget and off-budget funds,
- w_E is the average annual accrued wage/employee, thousands of rubles,
- V_L is the number of employees required for vacant positions by the end of the year, thousands,
- R_b is the revenues of the consolidated budget of Russia and state off-budget funds, billions of rubles.

3 RESULTS AND DISCUSSION

Recently, a new trend has been observed in the Russian labor market (a personnel shortage). There has been a shift toward unmet labor demand accompanied by low unemployment, replacing the previous trend of labor oversupply and high unemployment.

Table 1 shows the level and dynamics of vacancies in Russia, the US, and Germany in 2018-2022.



Table 1. Dynamics of unemployment rates and labor shortages in Russia, the US, and Germany for 2018-2022

Indicators	2018	2019	2020	2021	2022
Russia					
Number of employees required for vacant positions, at the end of the year, thousand people	968	1,103	1,405	1,798	1,951
Number of job vacancies, % of the labor force	1.27	1.46	1.88	2.39	2.60
Change in the number of job vacancies, % compared to the previous year	109.1	113.9	127.4	128.0	108.5
Unemployment rate, % of the labor force	4.8	4.6	5.8	4.8	3.9
US					
Number of unfilled job vacancies, thousand people	7,104	7,157	6,361	9,985	11,181
Number of job vacancies, % of the labor force	4.4	4.4	4.0	6.2	6.8
Change in the number of vacancies, % compared to the previous year	116.1	100.7	88.9	157.0	112.0
Unemployment rate, % of the labor force	3.9	3.7	8.1	5.3	3.6
Germany					
Number of unfilled job vacancies, thousand people	796	774	613	706	845
Number of job vacancies, % of the labor force	1.8	1.8	1.4	1.6	1.9
Change in the number of vacancies, % compared to the previous year	108.9	97.2	79.2	115.2	119.7
Unemployment rate, % of the labor force	3.4	3.1	3.8	3.6	3.1

Source: compiled and calculated based on Federal State Statics Service (2019, pp. 77-78; 2021; 2023, pp. 110-111), OECD (n.d.).

In the US and Germany, the number of job vacancies showed annual fluctuations, including negative dynamics in 2020. This reflects the impact of the global economic slowdown due to the COVID-19 pandemic. In Russia, the trend in job vacancies remained positive even amidst the coronavirus recession (Figure 2).

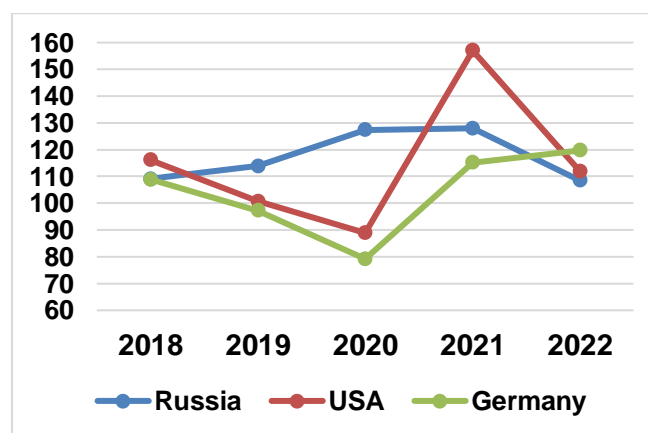


Figure 2. Labor shortage dynamics in Russia, the US, and Germany from 2018 to 2022 (change in the number of vacancies, % compared to the previous year)

Source: compiled and calculated based on Federal State Statics Service (2019, pp. 77-78; 2021, pp. 103-104; 2023, pp. 110-111); OECD (n.d.).

Despite fluctuations in the number of vacancies based on the overall economic situation

in each country, a persistent labor shortage remained a common feature of the labor market across all countries. During the specified period, the average shortage level as a percentage of the workforce was 1.92% in Russia, 5.16% in the US, and 1.70% in Germany.

Like unemployment, labor deficits are a chronic problem in modern labor markets, stemming from insufficient and/or inefficient labor utilization. At first glance, unemployment and labor shortages look like opposites. In a competitive labor market, a labor shortage should theoretically be alleviated by the inflow of workers from the unemployed population due to rising real wages. In other words, an increase in job vacancies should reduce unemployment, and a decrease in vacancies should increase it. However, unlike the US and Germany, where vacancy and unemployment rates tend to correlate, Russia's economy shows little correlation between unemployment and labor shortages (Figures 3-5).



Figure 3. Dynamics of unemployment and number of vacancies in Russia, 2000-2022
Source: compiled and calculated based on collections of the Federal State Statistics Service (n.d.-c).

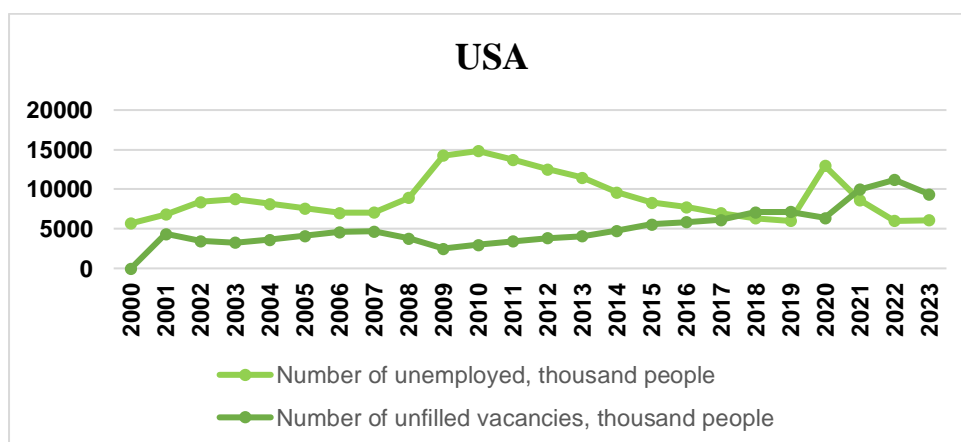


Figure 4. Dynamics of unemployment and number of vacancies in the USA, 2001-2023
Source: compiled and calculated based on OECD (n.d.), World Bank (n.d.).

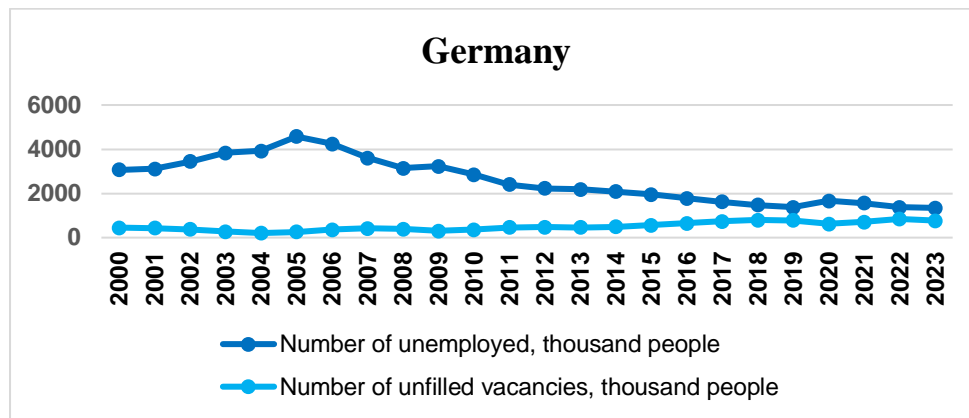


Figure 5. Dynamics of unemployment and number of vacancies in Germany, 2000-2023
 Source: compiled and calculated based on OECD (n.d.), World Bank (n.d.).

From Table 1, it is evident that in the US and Germany, an increase in the vacancy rate generally helped to alleviate unemployment levels, while a decrease in vacancies led to a rise in unemployment. In contrast, Russia saw a continual increase in the vacancy rate, while unemployment fluctuated, peaking in 2022 and reaching a low in 2023.

The average real wage in Russia is below the equilibrium level and relatively inflexible, showing limited responsiveness to shifts in labor demand and supply. Comparing real GDP dynamics with real wage trends (Table 2) shows that, from 2018 to 2022, wages did not proportionately increase with rising labor demand during economic upturns (as in 2021) and did not decrease alongside GDP during downturns (such as in 2020 and 2022).

Table 2. Dynamics of real GDP and real wages in Russia in 2018-2022

Indicators	2018	2019	2020	2021	2022
Change in real GDP (indices of physical volume of GDP), % to the previous year	102.8	102.2	97.3	105.9	98.8
Change in average monthly accrued real wages of employees of organizations, % to the previous year	108.5	104.8	103.8	104.5	100.3

Source: compiled and calculated based on Federal State Statics Service (n.d.-b; 2023, p. 147).

The labor market in Russia is in a state of chronic imbalance (an excess demand over supply) amid inflexible and suppressed wage levels. The statistics on labor supply, labor demand, real wages, and labor shortages (Table 3) indicate that:

– Demand, supply, and labor shortages in response to changes in real wages almost do not correlate. In 2018, despite a significant wage increase, labor supply decreased, demand slightly rose, and labor shortages continued to grow. In 2022, with wages remaining unchanged, labor supply sharply declined, leading to a significant increase in labor shortages. In 2020, a slight wage increase was accompanied by a similar rise in labor supply but both demand and labor shortages fell sharply.

– The correlation between real wages and labor supply and demand is also weak. In



2018, a slight decrease in labor supply and a rise in demand coincided with a sharp wage increase. In 2020, despite a drop in labor demand, wages continued to rise. In 2022, a sharp reduction in labor supply could have led to an increase in real wages but wages remained largely unchanged.

– Labor shortages, while weakly correlated with wage levels, show a clear dependency on labor supply and demand dynamics. In 2018, the decrease in supply and the increase in demand resulted in a rise in labor shortages. In 2020, as demand for labor declined, labor shortages sharply decreased; the opposite trend was observed in 2021. In 2022, as labor supply decreased further, labor shortages continued to grow.

Thus, it can be concluded that the problem of labor shortage in Russia:

a) Is caused by a chronic imbalance of supply and demand in the aggregate labor market triggered by low wages.

b) Has a more pronounced volume and structure (mismatch between the volume and structure of demand for labor and the supply of labor) than price (wage).

Table 3. Dynamics of labor supply, labor demand, real wages and labor shortage in Russia in 2018-2022

	2018	2019	2020	2021	2022
Change in labor supply, % from the previous year	99.6	98.7	100.2	98.5	98.6
Change in labor demand, % compared to the previous year	100.4	99.4	98.6	102.1	100.6
Change in average monthly accrued real wages of employees, % to the previous year	108.5	104.8	103.8	104.5	100.3
Change in labor shortage, % from the previous year	113.4	110.4	76.1	167.9	122.0

Source: compiled and calculated based on Federal State Statics Service (2019; 2021; 2023).

The overall labor market in Russia has become more rigid and struggling to address the labor shortage. The integral vacancy provision coefficient (the number of unemployed individuals/vacancy) steadily declined between 2018 and 2022, pausing its descent in 2020 but ultimately falling below 2 in 2022. This indicates a tightening labor market that lacks the flexibility to meet workforce demands. The situation is even more challenging in the US and Germany. In the US, the vacancy provision coefficient only reached 2 in 2020, driven by the COVID-19 recession and the subsequent sharp rise in unemployment. In other years, the coefficient dropped to below 1. In Germany, the coefficient fluctuated between 1.6 and 2.7, exceeding 2 only in 2020 and 2021 (Table 4).



Table 4. Dynamics of the integral coefficient of vacancy provision in Russia, the US, and Germany in 2018-2022

Indicators	2018	2019	2020	2021	2022
Russia					
Number of unemployed, thousand people	3,658	3,465	4,321	3,631	2,951
Number of employees required for vacant positions, at the end of the year, thousand people	968	1,103	1,405	1,798	1,951
Integral coefficient of vacancy provision (number of unemployed/vacancy)	3.8	3.1	3.1	2.0	1.5
US					
Number of unemployed, thousand people	6,314	6,001	12,948	8,623	5,996
Number of unfilled job vacancies, thousand people	7,104	7,157	6,361	9,985	11,181
Integral coefficient of vacancy provision (number of unemployed/vacancy)	0.9	0.8	2.0	0.9	0.5
Germany					
Number of unemployed, thousand people	1,468	1,373	1,658	1,563	1,377
Number of unfilled job vacancies, thousand people	796	774	613	706	845
Integral coefficient of vacancy provision (number of unemployed/vacancy)	1.8	1.8	2.7	2.2	1.6

Source: compiled and calculated based on Federal State Statics Service (2023, p. 147); OECD (n.d.).

As the number of unfilled job vacancies increases, Russia's economy incurs mounting losses, including:

- GDP underproduction (Table 5),
- Unrealized household income (Table 6),
- Unpaid taxes to the national budget (Table 7).

Table 5. Calculation of GDP losses due to labor shortages in Russia in 2018-2022

Indicators	2018	2019	2020	2021	2022
GDP at current prices, billion rubles	103,861.6	109,608.3	107,658.1	135,773.7	155,188.8
Number of employed, thousand people	72,532	71,933	70,601	71,719	71,974
GDP/employee, million rubles	1.43	1.52	1.52	1.89	2.16
Number of employees required for vacant positions, at the end of the year, thousand people	968	1,103	1,405	1,798	1,951
GDP underproduction due to unfilled job vacancies, billion rubles	1,384.24	1,676.56	2,135.60	3,398.22	4,214.16
GDP underproduction, % of created GDP	1.33	1.52	1.98	2.50	2.72

Between 2018 and 2022, the underproduction of GDP due to unfilled job vacancies more than doubled, amounting to 2.72% in 2022. The most significant increase in losses was observed in 2021.

Table 6. Calculation of lost income due to unfilled job vacancies in Russia in 2018-2022

Indicators	2018	2019	2020	2021	2022
Average annual accrued wages/employee, thousand rubles	524.7	574.4	616.1	686.9	784.1
Number of employees required for vacant positions, at the end of the year, thousand people	968	1,103	1,405	1,798	1,951
Lost wages, billion rubles	507.9	633.6	865.6	1235.1	1529.8
Remuneration of hired employees in GDP by sources of income, billion rubles	46,415.8	48,383.0	48,696.7	54,830.4	59,811.9
Lost wages, % of the total wages of employees	1.1	1.3	1.8	2.2	2.6

Source: compiled and calculated based on Federal State Statics Service (n.d.-b; 2023, pp. 147).

From 2018 to 2022, the annual amount of unpaid wages due to unfilled job vacancies tripled, increasing from 1.1% of the total wage bill for employees in 2018 to 2.6% in 2022.

Table 7. Calculation of lost insurance contributions to social funds and income taxes due to unfilled job vacancies in Russia in 2018-2022

Indicators	2018	2019	2020	2021	2022
Average annual accrued wages/employee, thousand rubles	524.7	574.4	616.1	686.9	784.1
Number of employees required for vacant positions, at the end of the year, thousand people	968	1,103	1,405	1,798	1,951
Lost accrued wages, billion rubles	507.9	633.6	865.6	1,235.1	1,529.8
Underpaid contributions to social funds (based on 30% of accrued wages) and underpaid income taxes (based on 13% of accrued wages), billion rubles	218.4	272.5	372.2	531.1	657.8
Revenues of the consolidated budget of Russia and state extra-budgetary funds, billion rubles	37,320.3	39,497.6	38,205.7	48,118.4	53,074.2
Unpaid insurance premiums and income taxes, % of consolidated budget revenues	0.6	0.7	1.0	1.1	1.2

Source: compiled and calculated based on Federal State Statics Service (n.d.-a; n.d.-b; 2023, p. 147).

From 2018 to 2022, the total amount of unpaid insurance contributions and income taxes tripled, resulting in increased revenue losses for the consolidated budget and state extrabudgetary funds, rising from 0.6% in 2018 to 1.2% in 2022.

4 CONCLUSIONS

Labor shortages are a reality regardless of management level, country, economic development, historical turbulence, climate, and geopolitical uncertainties. The causes of labor shortages should be divided into objective, subjective, demographic, socioeconomic, institutional, and those involving a cost-benefit analysis of labor market imbalances.



In addressing labor shortages, it is crucial to consider related risks, such as the outflow of skilled personnel, an aging population, and emigration.

Labor shortages, like unemployment, are driven by a chronic imbalance between labor supply and demand and wage rigidity. The worsening of these shortages indicates that labor markets cannot resolve this issue independently, even through wage increases.

The intensifying labor shortage is accompanied by growing economic losses, elevating workforce deficits to a macroeconomic issue requiring government intervention. Further research on labor shortages in Russia as a macroeconomic problem involves the following areas:

- Identifying the causes of wage rigidity,
- Determining the elasticity of labor demand and supply across industries and regions,
- Assessing the excess of demand over supply in labor markets, considering demographic, socioeconomic, political, and institutional factors,
- Examining the interaction and competition among various labor markets and their collective ability to address labor shortages,
- Revealing areas and the degree of government regulation in labor markets to alleviate labor shortage issues.

ACKNOWLEDGMENTS

This work was supported by an internal grant from the Plekhanov Russian University of Economics (Algorithm for solving the problem of personnel shortage in the social sphere (as exemplified by healthcare)).

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