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ECONOMIC AND SOCIAL CHANGES: FACTS, TRENDS, FORECAST

A peer-reviewed scientific journal that covers issues of analysis and forecast of changes in the economy and social spheres in various countries, regions, and local territories.

The main purpose of the journal is to provide the scientific community and practitioners with an opportunity to publish socio-economic research findings, review different viewpoints on the topical issues of economic and social development, and participate in the discussion of these issues. The remit of the journal comprises development strategies of the territories, regional and sectoral economy, social development, budget revenues, streamlining expenditures, innovative economy, and economic theory.

Founder: Vologda Research Center of the Russian Academy of Sciences

Federal State Budgetary Institution of Science Vologda Research Center of the Russian Academy of Sciences (VolRC RAS) is the only unit of the Academy on the territory of the Vologda Oblast. The history of the Center started in 1990 from a Department of the Institute for Economic Studies of the Kola Science Centre of RAS on studying the problems of socio-economic development of the Vologda Oblast. Since then the Center has undergone manifold transformations. In 1993 it became an independent subdivision – the Vologda Scientific Coordinating Center of RAS. In 2009 it transformed into the Institute of Socio-Economic Development of Territories of RAS (ISEDT RAS).

In 2017 the socio-economic research was supplemented by agricultural issues. ISEDT RAS was joined by the Northwestern Dairy and Grassland Farming Research Institute, and was reorganized into the Vologda Research Center of the Russian Academy of Sciences.

In 2019 the Center continued expanding having launched the Laboratory of Bioeconomics and Sustainable Development within the framework of the national project "Science". The Laboratory is engaged in scientific research aimed at introducing biotechnologies into the practice of agriculture.

The VolRC RAS Director is Aleksandra A. Shabunova (Doctor of Economics). The Academic Leader of the Center is Vladimir A. Ilyin (RAS Corresponding Member, Doctor of Economics, Professor, Honored Worker of Science of the Russian Federation).

MAIN RESEARCH DIRECTIONS

In accordance with the Charter, the Vologda Research Center carries out fundamental, exploratory and applied research in the following fields:

- problems of economic growth, scientific basis of regional policy, sustainable development of territories and municipalities, and transformations of socio-economic space;
- regional integration into global economic and political processes, problems of economic security and competitiveness of territorial socio-economic systems;
- territorial characteristics of living standards and lifestyle, behavioral strategies and world view of different groups of the Russian society;
- development of regional socio-economic systems, implementation of new forms and methods concerning territorial organization of society and economy, development of territories' recreational area;
- socio-economic problems regarding scientific and innovative transformation activities of territories;
- elaboration of society's informatization problems, development of intellectual technologies in information territorial systems, science and education;
- development of scientifically based systems of dairy cattle breeding in the conditions of the North-Western region of Russia;
- development of new breeding methods, methods and programs for improving breeding work with cattle;
- development of scientifically based feed production systems, norms, rations and feeding systems for cattle in the conditions of the North-Western region of Russia;

- development of zonal technologies for the cultivation of agricultural crops;
- development of technologies for the creation, improvement and rational use of hayfields and pastures in the conditions of the North-Western region of Russia;
- development of technologies and technical means for agricultural production in the North-Western region of Russia;
- assessment of biodiversity in the North-Western region of Russia;
- development and implementation of biotechnologies in agricultural production;
- improvement of breeding methods and creation of new varieties of forage crops.

INTERNATIONAL TIES AND PROJECTS

VolRC RAS is actively developing its international activities. It is involved in joint international grant projects and regularly holds international conferences and workshops. The Center has Cooperation agreements and Memoranda of understanding with research organizations:

2007 – Cooperation agreement is signed with the Institute of Sociology of the National Academy of Sciences of Belarus , Center for Sociological and Marketing Investigations at the "International Institute of Humanities and Economics" (Belarus, 2008).

2008 – Memorandum of agreement is signed with Alexander's Institute at the Helsinki University (Finland, 2008).

2009 – Cooperation agreement is signed with Center for System Analysis of Strategic Investigations of NAS (Belarus, 2009).

2010 – Cooperation agreement is signed with the Institute of Economics of the National Academy of Sciences of Belarus (Minsk, Belarus, 2010).

2011 – Cooperation agreements are signed with National Institute of Oriental Languages and Civilizations (Paris, France, 2011), Institute of Business Economy at Eszterhazy Karoly College (Hungary, 2011), Republican research and production unitary enterprise "Energy Institute of NAS" (Belarus, 2011). Memoranda of understanding are signed with Jiangxi Academy of Social Sciences (China, 2011), Research and Development Center for Evaluation and Socio-Economic Development and the Science Foundation of Abruzzo region (Italy, 2011).

2012 – Cooperation agreement is signed with Center for Social Research at the Dortmund Technical University (Germany, 2012).

2013 – Memorandum of understanding is signed with Jiangxi Academy of Social Sciences (China, 2013). July 2013 – The application for research performance by international consortium involving ISEDT RAS within the 7th Framework Programme of European Community.

2014 – Cooperation agreement is signed with Center for System Analysis and Strategic Research of the National Academy of Sciences of Belarus (Belarus, 2014). Memoranda of understanding are signed with Jiangxi Academy of Social Sciences (Mao Zhiyong, China, 2014), National Institute for Oriental Studies INALCO (Julien Vercueil, France, 2014).

2015 – Memorandum of understanding is signed with Jiangxi Academy of Social Sciences (China, 2015). Cooperation agreement is signed with the Institute of Sociology of the National Academy of Sciences of Belarus (Belarus, 2015).

2016 – Cooperation agreements are signed with the Center for the Study of Industrialization Modes of the School of Advanced Studies in the Social Sciences (EHESS) (Paris, France, 2016); Institute of Philosophy, Sociology and Law of NAS RA (Yerevan, Armenia, 2016); Yerevan Northern University (Armenia, 2016), Yerevan State University (Armenia, 2016). Memoranda of understanding are signed with Jiangxi Academy of Social Sciences (China, 2016).

2018 – Cooperation agreements are signed with the Department of Agrarian Sciences of the National Academy of Sciences of Belarus (Belarus, 2018); the Republican Unitary Enterprise "Scientific and Practical Center of the National Academy of Sciences of Belarus for Agricultural Mechanization" (Belarus, 2018). Memorandum of understanding is signed with the European School of Social Innovation (ESSI) (Germany, 2018).

2019 – Memorandum of understanding is signed with Jiangxi Academy of Social Sciences (China, 2019).

2020 – Memorandum of understanding is signed with Jiangxi Academy of Social Sciences (China, 2020).

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EDITORIAL

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Vladimir Putin's 25 Years of Presidential Terms: "Warrior", "Ruler", "Creator"

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Abstract. October 7, 2024, Minchenko Consulting Communication Group published a report entitled "The dynamics of Vladimir Putin's image: From a "Warrior" to a "Ruler-Creator", dedicated to analyzing the activities of the head of state over the past 25 years. The experts identify three images ("Warrior", "Ruler", "Creator"), which at different stages of Russian history were typical for the public figure of Vladimir Putin. Moreover, the consistent transformation of these images was determined mainly by two factors – the nature of the challenges facing the country and those facing the President personally, as well as the needs and expectations of the broad strata of Russian society. In the context of the general idea proposed by the specialists of Minchenko Consulting, we express our own point of view on the processes taking place in the country and in the dynamics of Vladimir Putin's image throughout his presidential terms. We show the key role of the civilizational confrontation between Russia and the West in the transformation of the image of the President as an exponent of public expectations. We pay considerable

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attention to the analysis of the internal changes taking place in the country, following the results of three years of the special military operation. We present expert assessments characterizing the historical reasons for the special military operation, as well as Russia's prospects in the emerging multipolar world. The paper also presents data from the current round of the monitoring of managerial decisions adopted by the President and the Government of the Russian Federation; we have been conducting the monitoring for more than two and a half years. Our contribution consists in an in-depth analysis of events and processes taking place in the country, which is presented in a historical context, based on expert assessments from a wide range of specialists in different fields of knowledge (economists, political scientists, sociologists, historians, etc.), as well as on the data of our own sociological surveys conducted in the monitoring mode, current reports in the media, own long-term experience in studying the effectiveness of public administration.

Key words: President, elites, special military operation, public opinion, civilizational conflict.

October 7, 2024, Minchenko Consulting Communication Group published a report on the transformation of the image of the President of the Russian Federation Vladimir Putin for the entire period of his political activity[1]. According to experts, "changing a politician's public image is not just about changing their own self-image. **This is a change in the dominant attitudes in public communication regarding a particular political figure"**[2]. Or, in other words, a reflection in the image of a politician of the expectations and hopes of the majority of the population; in this case an image is understood as "a holistic and sustainably reproducible impression of the politician, their motives, methods of action and possible results of activity"[3].

The image of Vladimir Putin has changed in many ways in the 25 years since his first inauguration (May 7, 2000). Having started as a "Warrior" defending Russian statehood from complete destruction as a result of the actions of Boris Yeltsin's "team", the Chechen conflict, terrorist attacks, the economic and demographic crisis, etc., today Vladimir Putin represents a completely different image – a man who "forms a new world order with new rules and a new place of the country in it"[4].

> "The public image of a politician who has been in power for more than one term **inevitably transforms** during their time in office: under the influence of external circumstances or as a result of personal choice, in order to achieve political goals, or it simply expresses a change in the emotional background....
>
> **Putin began his presidency in the archetypal image of a"Warrior", over the years becoming a full-fledged "Ruler" who makes changes to the world order in real time, creating a new world order in the role of a "Creator".**
>
> A "Warrior" is a single-minded and active fighter who strives, on the one hand, to defeat enemies, and on the other, to protect friends/people/voters (p. 5).
>
> A "Ruler" creates order out of chaos and supports it, organizes processes, and builds hierarchy (p. 22).
>
> A "Creator" is a person who creates a new world order in which Russia will have a completely new role, and creates new rules of the game within the country and a new elite (p. 18).

[1] Dynamics of Vladimir Putin's image: From a Warrior to a Ruler-Creator: Report. Minchenko Consulting. October 2024. 23 p. Available at: https://minchenko.ru/news/news_235.html

[2] Ibidem. P. 4.

[3] Ibidem. P. 2.

[4] Ibidem. P. 18.

And this transformation is an outcome of a complex interweaving of external and internal factors that can only be analyzed in a single historical context.

Of course, the special military operation became a major factor that influenced both the image of Vladimir Putin and the expectations and needs of the population reflected in it. We recall that the forced decision to launch the SMO was made by the RF President on February 24, 2022, after the NATO countries ignored Russia's official demands to ensure national security guarantees in January 2022[5]. The SMO has been going on for three years now, and during this period (as Vladimir Putin himself noted), he "almost stopped laughing and is now honing his skills in identifying key issues and concentrating his attention and energy on solving them"[6].

However, the SMO is only part of the "big path" toward transforming the image of the President and the image of Russia. The beginning of this path should be sought not even from the moment when Vladimir Putin's first inauguration took place (May 7, 2000), but much earlier – starting in the 1980s, when the first prerequisites for the collapse of the USSR were created, and even from the mid-1950s, when the country's ruling elites under Nikita Khrushchev's government and in the absence of Joseph Stalin's "iron hand", for the first time truly, without fear of consequences, began to acquire professional, financial, personal, family "connections" in the West...

"Stalin once said that after his death, a lot of garbage would be piled upon his grave, but the wind of history would disperse it. **Everything turned out as the leader had foreseen. Less than a few years later, Nikita Khrushchev, one of the main 'Stakhanovites of terror' of the 1930s** (it was on his request to increase quotas for executions that Stalin wrote: 'Calm down, fool') **began to pour mud on the leader.** Khrushchev was not the first in this regard: Trotsky began systematically throwing mud (though interspersed with real criticism) at Stalin, but a not too bright Khrushchev, a former Trotskyist, was content with mud-throwing alone. Then Khrushchev was joined by 'scavengers' – the most zealous representatives of the 'Sixtiers', not to mention the dissidents who sang 'to other people's voices' and 'rode' on other people's waves: they were part of Western anti-Soviet propaganda"[7].

"From Khrushchev, there is a direct line to Gorbachev and Yeltsin, that is, to the betrayal of national and class interests"[8].

[5] December 17, 2021, the Russian side officially presented requirements to the U.S. and NATO countries to provide legal guarantees of national security (they are published on the official website of the Russian Foreign Ministry: https://www.mid.ru/ru/foreign_policy/news/1790809/), including the requirements to exclude further NATO expansion to the east and the accession of Ukraine to the alliance; to refuse any NATO military activities in Ukraine, Eastern Europe, Transcaucasia, Central Asia; not to establish military bases in post-Soviet countries, etc. However, January 26, 2022, U.S. Secretary of State A. Blinken stated that "the U.S. will not abandon the open door policy in NATO", and NATO Secretary General J. Stoltenberg said, "We cannot compromise on the principles on which our security has been based for decades". It was only after diplomatic steps taken by Russia to avoid conflict were ignored that Putin was forced to announce the start of the SMO (February 24, 2022).

[6] "Results of the year" with Vladimir Putin. December 19, 2024. Available at: http://www.kremlin.ru/events/president/transcripts/75909

[7] Fursov A. Stalin and the wind of history. Available at: https://zavtra.ru/blogs/stalin-i-veter-istorii-2013-02-06-000000?ysclid=m7a2od2u1w372301822

[8] Fursov A. XX Congress of the CPSU – a milestone on the path of national betrayal. Available at: https://izborsk-club.ru/8447

It was during Khrushchev's time, as head of VCIOM V. Fedorov writes, that "the roots of the collapse of the USSR were found... **First of all, it is the nomenklatura itself**, which simply wants to live without fear of a dictator. This desire is reasonable; however, solving their small philistine tasks, the bureaucracy unwittingly jams the management system"[9].

S. Naryshkin: ***"We need to fully wake up from the liberal "stupor" of the 1990s*** and return to the roots. We have our own way. Russia is an original country, a civilization with a thousand-year history that should not be forgotten, much less betrayed"[10].

S. Kurginyan: ***"The liberal fog has put into people's heads the idea that it is possible to end an entire historical period, to create a "black hole" in place of 70 years of Soviet history"***[11].

E. Ivanov: "The one who does not respect his history is vicious... The Soviet government brought up aristocratic spirit in the people of labor. It turns out that if you can't erase all this, then you can sweep it under the rug, cover it up. Therefore, opponents constantly weave an anti-Soviet, and therefore an anti-patriotic basis into the canvas of the positive. ***Moreover, the defamation is intensifying... The liberal fog has not yet lifted"***[12].

The process of "internal fermentation" of the Soviet elites (as we noted in one of our previous papers[13]), coinciding with the openly proclaimed ambitions of the Collective West for world domination, it eventually led to the destruction of the Soviet Union. **But more importantly, the collapse of the USSR plunged Russia into a "liberal fog" (as experts call it) for almost 35 years.**

And there are people who are personally responsible for this "largest geopolitical catastrophe of the 20th century"[14] *(Insert 1)*. As noted by RAS Corresponding Member Zh.T. Toshchenko, the betrayal committed by them in the late 1980s and early 1990s has "**no statute of limitations**"[15]; "everyone who participated in the destruction of the Soviet Union **has their own measure of responsibility for this sweeping tragedy**"[16].

"The man-made nature of our tragedy and its consequences should already be clear to everyone today. After all, if you think about it, **the current military operation in Ukraine is the forced result of the treacherous actions of the very "fifth column" aimed at eliminating the Soviet power. That is why there is no statute of limitations for crimes committed by M. Gorbachev, B. Yeltsin, A.N. Yakovlev and others like them"**[17].

[9] Fedorov V.V. Review of G. Derlugian's book "How the World Works". Sketches on macrosociological topics (2013). Fedorov V.V. Uma palata. VCIOM, 2023. P. 24.

[10] Naryshkin urged to finally wake up from the liberal stupefaction of the 1990s. Available at: https://ria.ru/20231207/rossiya-1914337076.html?ysclid=m6kh5av27e263110085

[11] Kurginyan S. The Russian cauldron has boiled over, what explosions are planned in Russia? Available at: https://eot.su/node/24020

[12] Ivanov E. Do not lose vigilance! Available at: https://yarkprf.ru/%D0%BD%D0%B5-%D1%82%D0%B5%D1%80%D1%8F%D0%B9%D1%82%D0%B5-%D0%B1%D0%B4%D0%B8%D1%82%D0%B5%D0%BB%D1%8C%D0%BD%D0%BE%D1%81%D1%82%D1%8C/

[13] Ilyin V.A., Morev M.V. (2023). The system of oligarchic capitalism in Russia is inconsistent with the achievement of the goals of the special military operation. *Economic and Social Changes: Facts, Trends, Forecast*, 16(4), 9–37.

[14] Presidential Address to the Federal Assembly of the Russian Federation on April 25, 2005. Available at: http://www.kremlin.ru/acts/bank/36354

[15] Toshchenko Zh.T. (2022). Abyss of betrayal – Alexander Yakovlev. *Pravda*, 91(31294), August 19–22.

[16] Ibidem.

[17] Ibidem.

Some personal characteristics of representatives of the ruling elites responsible for the destruction of the USSR (source: a series of interviews by Pravda newspaper political commentator V. Kozhemyako with RAS corresponding member Zh.T. Toshchenko):

1. **"All of them are characterized by extreme moral, moral impurity, or more precisely, absolute immorality... the feeling of patriotism is unknown to most of these people"**[18].
2. **"An irrepressible, unlimited, and even pathological desire for power became the meaning of life for them... they reached a fantastic scale of their capital without investing a single ruble in production, in the creation of material and spiritual values! They simply robbed the people, appropriating the enormous wealth they had created during the Soviet era"**[19].
3. **"It is more important for them to be visible and make a favorable impression.** And as a rule, they like themselves very much, often even admire themselves... **However, obsession with form to the detriment of content, and even more so increased complacency, not supported by weighty deeds, is clearly flawed.... Blatant incompetence and absolute inability to do the job assigned – that's what it is"**[20].
4. **"... a lot of random and completely unsuitable people rose to the top of power.** Such, if I may say so, was Yeltsin's personnel policy, this **mixture of arbitrary fantasies and absurd decisions"**[21].

Zh.T. Toshchenko writes: "The late Soviet elite did not consider sovereignty an absolute value... objectively speaking, it served the interests not of its native country, but of a completely different state – the "city upon a hill", as the United States calls itself..."[22] This is clearly demonstrated by the personal characteristics *(Insert 1)* and public statements of its representatives, for example, the first President of the Russian Federation Boris Yeltsin.

Excerpts from Russian President Boris Yeltsin's Address to U.S. Congress on June 17, 1992[23]:

1. "Citizens of Russia upheld their freedom and did not allow the continuation of the 75 years of nightmare. From this high rostrum I want to express our **sincere thanks and gratitude to President Bush and to the American people for their invaluable moral support** for the just cause of the people of Russia".
2. "We realize our great responsibility for the success of our changes, **not only toward the people of Russia, but also toward the citizens of America and of the entire world. Today the freedom of America is being upheld in Russia**".
3. "Dear members of the Congress! Every person bears the stamp of their time. There is no exception for anyone – neither for an ordinary citizen nor for the President. Much has been experienced, much has been rethought. And now I would like to end my speech with the words from a song by Irving Berlin, an American composer of Russian origin: **"God bless America!"**

[18] Toshchenko Zh.T. (2022). Insidious knife in the back of state security. *Pravda*, 106(31309), September 23–26.
[19] Toshchenko Zh.T. (2021). Disguises of werewolves. *Pravda*, 93(31153). August 27–30.
[20] Ibidem.
[21] Toshchenko Zh.T. (2022). The Nemtsov outdid Khlestakov himself. *Pravda*, 132(31335), November 25–28.
[22] Toshchenko Zh.T. (2022). Insidious knife in the back of state security. *Pravda*, 106(31309), September 23–26.
[23] Full text of Yeltsin's Address to U.S. Congress on June 17, 1992. Available at: https://proza.ru/2024/03/19/1226?ysclid=m6khxsqq2m355394926

Insert 1

Personal characteristics of representatives of the ruling elites responsible for the destruction of the USSR

(source: a series of interviews of V. Kozhemyako, political observer of *Pravda*, with RAS Corresponding Member Zh.T. Toshchenko)

M. Gorbachev[24]: *1. "As a result of Gorbachev's activities, the USSR was transformed from an active subject of foreign policy into a pathetic object that was being manipulated from the outside.* *2. In Gorbachev's version, the idea of human responsibility to society and the need for civil and personal duties was completely overlooked. As a result, an atmosphere of moral nihilism began to form, the triumph of extreme forms of individualism, which subsequently led to a wave of arbitrariness in post-Soviet Russia.* *3. Before us is a man who, by the will of accidental circumstances, ascended to the top of power, but showed extreme poverty of thought alongside exorbitant ambition and a feeling of his own infallibility... his low cultural level, unscrupulousness, and primitivism of thought led to the fact that he betrayed the ideals to which he swore in his youth and which he seemed to serve."*
N. Yakovlev[25]: *1. "Rebirth, mutation, cynicism, hypocrisy, adaptability – this is not a complete list of his characteristics...* *2. There were and still are serious reasons to consider him a 'mole', that is, an enemy agent...* *3. His duality is undeniable, and it has only grown over time.* *4. Disguised in a respectable costume of an intellectual. This is exactly what he wanted to look like in the eyes of the liberal pro-Western part of the Russian intelligentsia. Meanwhile, he drew his 'wisdom' from the stagnation of concepts promoted by the whole host of anti-Soviets and anti-Communists from different countries against the USSR...* *5. Whether his relations with the enemy special services were somehow shaped or not, the main thing is absolutely clear: the entire Canadian decade was for him a time of intense preparation for the destruction of the hated USSR...* *6. Yakovlev will speak out later: 'I was talking about the 'renewal of socialism', but I knew what was going on'. He didn't just know, he directed it".*
B. Berezovsky[26]: *1. "His arrogance knew no bounds, and hardly anyone could surpass him in this...* *2. He stole on a gigantic scale. And he didn't just steal, but often also demonstrated his impunity, which gave rise to calling this specific phenomenon the 'Berezovshchina'....! De facto, this adventurer found himself at the helm of making many important decisions that were maturing at the very top. At first, however, his influence was behind the scenes, as is typical of the 'gray cardinal'. But soon enough, he officially holds influential positions in power – first in the Security Council, and then in the leadership of the CIS...* *3. He considered each person from the point of view of profitability or disadvantage for the capital he created. Today, for example, he needs Kadannikov from VAZ and Korzhakov, Yeltsin's chief security guard, and he is getting closer to personal friendship with them. And tomorrow they become unnecessary, even burdensome in some ways, and Berezovsky discards them as waste material. If someone becomes an obstacle in his business, they may lose their life".*

[24] Toshchenko Zh.T. (2021). Political nothingness. *Pravda*, 69(31129), July 2–5.

[25] Toshchenko Zh.T. (2022). Abyss of betrayal – Alexander Yakovlev. *Pravda*, 91(31294), August 19–22.

[26] Toshchenko Zh.T. (2022). Berezovsky's Diaboliad. *Pravda*, 64(31267), June 17–20.

Continuation of Insert 1

A. Kozyrev[27]:

1. Kozyrev is "the most shameful foreign minister in the country's history"[28].

2. "Since his first steps in a high position, he proved himself to be an impeccable follower and conductor of American politics. The main focus in everything was on the United States. It is the main light and idol for the Russian minister. It was not just obsequiousness that caught the eye, but a real obsequiousness to the Americans. If when communicating with other Western colleagues, Kozyrev said the word 'Yes' then with American colleagues – 'Yes, sir'. He really wanted not only to make friends, but also to become related to the United States...

3. The person of certain views makes it clear to everyone that he does not identify himself with either the history or the future, nor with the problems and achievements of Russia, that is, with anything that worries and interests its true citizens. Here is the collaborator Kozyrev, who was entrusted with the foreign policy of 'this country'.

4. His large-scale meanness all the time alternates with small-scale meanness, and his large-scale self-serving behavior is accompanied by the penny-pinching of a pickpocket. As they say, he didn't shy away from anything, and he doesn't shy away from anything, he's ready to do anything for the sake of profit".

A. Sobchak[29]:

1. "He brought only his experience of emotional demagoguery to real management.... He behaved shamefully. But this allowed him to take a prominent place in the growing pseudo-democratic wave.... Sobchak was naturally driven by a desire for publicity, a desire to present himself as effectively as possible in any case and situation, so as not to miss the chance to make a favorable impression. He was constantly looking for an opportunity to show off in connection with any rumored causes....

2. I do not have detailed information about how much Mr Sobchak enriched himself while working in Saint Petersburg government, and hardly anyone else besides his family has such information in full. But even from the information that has penetrated the media, it is clear that he was constantly concerned about this....

3. Arrogance and conceit, the ability to distort or lie without blushing, disrespect for the interlocutor and their opinion if it differs from his own, confidence in his messianic destiny and the absolute correctness of his policy, and finally, the complete conviction that there are no means that would not justify their goal – this is the true characteristics of poseurs, which Sobchak worthily represents".

B. Yeltsin[30]:

1. "Like Gorbachev, Boris Yeltsin betrayed the cause he served, rising to high party and government posts. He betrayed the cause and then sided with those for whom our Homeland was an 'evil empire'.

2. I call his favorite methods of leadership ostentatious reprisals under the guise of 'integrity'. In fact, it was not integrity, but the unbridled capriciousness of a boss intoxicated with power. He ruthlessly and 'colorfully', just to show off, dealt with those leaders of cities and districts whom he did not like for some reason.

3. A confirmed careerist Yeltsin went out of his way to please Gorbachev, who turned out to be his boss.

4. Mr Yeltsin started rising to power precisely with the help of calculated hypocrisy, portraying a true democrat and patriot.

5. All his, if I may say so, opposition activities were essentially reduced to spurring the process of the collapse of the country, which Gorbachev unleashed.

6. Lies permeated his entire ascent and subsequent reign. After all, Yeltsin and his entourage did not say that they intended to put the country on the rails of capitalism, completely rejecting socialist achievements, experience and prospects. There was an incredible deception of the people in terms of casuistry and scale".

[27] Toshchenko Zh.T. (2022). This Kozyrev played other people's trump cards. *Pravda*, 40(31243), April 15–18.

[28] Toshchenko Zh.T. (2022). Do many remember who Burbulis was? *Pravda*, 28(31231), March 18–21.

[29] Toshchenko Zh.T. (2021). Sobchak is a narcissistic blabbermouth and poser. *Pravda*, 114(31174), October 15-18.

[30] Toshchenko Zh.T. (2021). He became a murderer of his country. *Pravda*, 108(31168), October 1-4.

End of Insert 1

G. Burbulis[31]: *1. "As for Gennady Burbulis, it seems that long before the Belovezha collusion, the idea of liquidating the USSR was maturing in his head... he was among those who persistently advised Yeltsin to get rid of the USSR, not to consider questions about its preservation, improvement or transformation...* *2. His career path very clearly shows how during the troubled period of the breakdown of Soviet life there emerged all kinds of adventurers, seekers of fame and money, who did not have a penny of real, business value. But they all came forward, impudently claimed something, and many obtained desirable positions....* *3. He revels in himself! He calls his activities heroic, especially in the fall of 1991. They say that the country was on the verge of famine, and he, Burbulis, was saving it... However, no matter how heroically he portrayed himself, soon enough it became clear to almost everyone in his entourage, including Yeltsin, that fuss was not a sign of skillful management".*
E. Gaidar[32]: *1. "The main direction of economic reforms was determined by the 'shock therapy' proposed by Gaidar and Chubais. Its essence is the lightning-fast implementation of fundamental transformations in the economy according to the principles of market fundamentalism, the destruction in a short time of all elements of the former socialist industrial relations, the rejection of Soviet labor values and moral principles. Their attitude is to act quickly, decisively and absolutely ruthlessly to achieve their own goals... At the same time, the people were considered only as an object of ideological and political influence, an obedient 'gray mass'.* *2. The direct robbery of the people in the form of 'price holidays' was complemented by the devaluation of the savings of the population, the 'pulverization' of deposits in Sberbank, where people's long-term monetary savings were stored ... something happened that could not help but happen. The main problem for the people from this 'reform' was that the Russian liberals 'surrendered' the domestic market to Western competitors.* *3. Under Gaidar, our country was constantly in the position of a supplicant, with an outstretched hand ... The blow of the so-called market reforms significantly exceeded our losses during the Great Patriotic War. And the consequences have not been overcome so far".*
B. Nemtsov[33]: *1. "He took on various jobs in his positions, but he didn't succeed, he didn't finish anything. However, he was able to make a lot of noise – in fact, with his claims to importance. He remained, to sum up his life, an empty flower, a narcissist who finds satisfaction in admiring himself...* *2. The abundance of endeavors, which were promoted in all sorts of ways in countless interviews and articles, exceeded all possible boundaries ... And with the 'fruits' it was much worse. The bottom line is this: all these 'initiatives' and attempts to implement them were dominated by comrades in the fight against the former regime. They were very good at criticizing him, but they couldn't do anything useful. And therefore, the proclaimed initiatives failed one after another, without achieving at least some useful results.* *3. Nemtsov really liked when he was called Mr Yeltsin's favorite: they say, it was Yeltsin who identified him as the first candidate for the main place in the country's leadership".*
O. Kalugin[34]: *1. "His cunning, dexterity, and the art of mimicry were outstanding. In the most sensitive situations, he was able to build an alibi for himself, regardless of the fact that he sometimes scuppered other, innocent people. He didn't stop even when someone's life had to be taken away for the sake of his own well-being....* *2. There is reason to believe that it was then [1958–1959] that their connection with the American special services arose. And although not everything can be confirmed with documents, an analysis of those circumstances, as well as the subsequent behavior of Yakovlev and Kalugin, highlights the true background of their actions...* *3. He always spoke out taking into account what is beneficial or unprofitable for him now. He was keeping his mercantile interest firmly in mind; this is inherent in all these werewolves. They were actually being sold, and the money was carefully calculated".*

[31] Toshchenko Zh.T. (2022). Do many remember who Burbulis was? *Pravda*, 28(31231), March 18–21.
[32] Toshchenko Zh.T. (2022). "Shock therapist" Gaidar acted firmly and mercilessly. *Pravda*, 20(31223), February 25–28.
[33] Toshchenko Zh.T. (2022). The Nemtsov outdid Khlestakov himself. *Pravda*, 132(31335), November 25–28.
[34] Toshchenko Zh.T. (2022). Insidious knife in the back of state security. *Pravda*, 106(31309), September 23–26.

1. **"...we did offer every option to our Western partners, as I used to call them, we thought we were one of them, we wanted to be in the family of so-called civilized nations.** I reached out to NATO suggesting that we look into that possibility, but we were quickly shown the door; they didn't even bother to consider it"[35].

2. "I have said this publicly to both our allies and partners. There was a moment when I simply suggested: **perhaps we should also join NATO? But no, NATO does not need a country like ours"**[36].

3. "...I've said it **publicly**, I can reiterate. At a meeting here in the Kremlin with the outgoing President Bill Clinton, right here in the next room, I said to him, I asked him, 'Bill, do you think if Russia asked to join NATO, do you think it would happen?' Suddenly he said: 'You know, it's interesting, I think yes'. But in the evening, when we had dinner, he said, 'You know, I've talked to my team, no-no, it's not possible now... **I asked the question, 'Is it possible or not?' And the answer I got was no... If he had said yes, the process of rapprochement would have commenced, and eventually it might have happened if we had seen some sincere desire on the part of our partners. But it didn't happen"**[37].

We should note that Vladimir Putin at the beginning of his first presidency repeatedly made attempts to "integrate" Russia into the family of so-called civilizational peoples. He has spoken about this publicly more than once. This is also evidenced by the fact that, in principle, he was able to lead the country in conditions of a completely liberal state and the total superiority of pro-Western elites in the public administration system.

As experts have noted, **"if in our recent history one is to look for a period of truly serious and persistent efforts to fit Russia into a Western-centric model, it is the early years of Putin's presidency"**[38].

"At the end of 1999, the Russian Federation was a **weak country in crisis, which, as it seemed to many at the time, was facing the second and final phase of its disintegration.** The first phase took place in 1991, when 15 countries, including the Russian Federation, emerged instead of a large historical Russia... **This country, governed by a coalition of oligarchs and a confused, weak bureaucracy, had no coherent foreign policy – and could not have... What Boris Yeltsin handed to Putin was a weak Russia that had lost not only almost all of its positions in the world, but also, even more terrifyingly, respect"**[39].

[35] Vladimir Putin's meeting with war correspondents on June 13, 2023. Available at: http://www.kremlin.ru/events/president/news/71391/videos

[36] Vladimir Putin's speech at the Valdai International Discussion Club meeting on October 5, 2023. Available at: http://www.kremlin.ru/events/president/transcripts/72444

[37] Vladimir Putin's interview to Tucker Carlson on February 9, 2024. Available at: http://www.kremlin.ru/events/president/news/73411

[38] Lukyanov F. Why was Putin disappointed in the Western way for the Russian Federation: An interview to the newspaper *Argumenty i fakty*. Available at: https://dzen.ru/a/Y_d-SiCGcVQwnb5p?ysclid=m702szll2q812452364

[39] Akopov V. (2017). Vladimir Putin's world order. In: Russian Federal publication "Gross Domestic Product (GDP)". No. 102. P. 36. Available at: https://xn--b1aa3b.xn--p1ai/magazine/vvp102.html?EID=28911

At the same time, it is also necessary to understand the general situation (in the country, in the government) in which Vladimir Putin began his presidential activity. It was a time of active struggle against the "semibankirschina"[40] and the ongoing Chechen war, the cessation of which was **the primary condition for the preservation of Russian statehood and the main thing that the President focused on.**

However, "starting as a Western-oriented politician, the President gradually became disillusioned with this path for Russia"[42]. Rather, he was not just "disappointed", but he realized that **the West needs Russia only in the form of a colony** (in particular, this was openly stated by U.S. President B. Clinton, voicing the strategy of U.S. foreign policy toward Russia).

Vladimir Putin: "**In 2000, after I was elected President, I will always remember what I faced: I will remember the price we paid for destroying the den of terrorism in the North Caucasus, which the West almost openly supported at the time... after the situation had stabilized, when the main terrorist gangs had been defeated,** including thanks to the bravery of the Chechen people, we decided not to turn back, not to play the offended, but to move forward, to build relations even with those who actually acted against us, to establish and develop relations with all who wanted them, based on mutual benefit and respect for one another. **We thought it was in everyone's interest..."**[41]

Vladimir Putin (2022): "The West managed to grab hold of Russia's wealth only in the late 20th century, when the state had been destroyed. They called us friends and partners, **but they treated us like a colony"**[43].

"The so-called West, with its colonial habits and its habit of fomenting national conflicts around the world, seeks not only to restrain our development; **instead of Russia, they need a dependent, fading, dying space where they can do anything"**[44].

[40] "Semibankirschina – seven oligarchs whom the team of former President Boris Yeltsin 'relied on':
1. Vladimir Potanin (ONEXIM Bank),
2. Vladimir Gusinsky (Bridge Bank),
3. Mikhail Khodorkovsky* (MENATEP),
4. Pyotr Aven (Alfa-Bank),
5. Mikhail Fridman (Alfa-Bank),
6. Alexander Smolensky (Capital Savings Bank, since 1997 – SBS-Agro),
7. Boris Berezovsky (United Bank).

A number of media outlets also included Vladimir Vinogradov (Inkombank) and Vitaly Malkin (Russian Credit) in the semibankirschina (source: https://ria.ru/20111108/483944714.html).

According to B. Berezovsky (as follows from his interview with the Financial Times on November 1, 1996), these seven people "controlled more than 50% of the Russian economy and jointly influenced the adoption of the most important domestic political decisions in Russia".

February 28, 2000, at a meeting with trusted officials, Vladimir Putin announced that "all participants in the game, both on the political stage of the country and in the economy, should be placed on absolutely equal terms so that no one could gain any advantages by approaching power from the left or the right". After that, the most notorious representatives of the semibankirschina were either arrested or forced to leave the country.

* Included in the register of foreign agents.

[41] Putin. Valdai 2022. Available at: http://www.kremlin.ru/events/president/transcripts/69695

[42] Lukyanov F. Why was Putin disappointed in the Western way for the Russian Federation: An interview to the newspaper *Argumenty i fakty*. Available at: https://dzen.ru/a/Y_d-SiCGcVQwnb5p?ysclid=m702szll2q812452364

[43] Vladimir Putin's speech at the ceremony for signing the treaties on the accession of the Donetsk People's Republic, the Lugansk People's Republic, the Zaporozhye Region and the Kherson Region to the Russian Federation, September 30, 2022. Available at: http://www.kremlin.ru/events/president/transcripts/speeches/69465

[44] Presidential Address to the Federal Assembly of the Russian Federation on February 29, 2024. Available at: http://www.kremlin.ru/events/president/news/73585

Excerpt from a speech by U.S. President Bill Clinton at a secret meeting of the Joint Chiefs of Staff on October 24, 1995[45]**:**

"Over the past ten years, our policy toward the USSR and its allies has convincingly proved the correctness of our course towards eliminating one of the strongest powers in the world, as well as the strongest military bloc. **Using the blunders of Soviet diplomacy, the extreme arrogance of Gorbachev and his entourage, including those who openly took a pro-American position**, we achieved what President Truman was going to do to the Soviets with the atomic bomb. However, with one significant difference – **we received a raw material appendage, and not a state destroyed by an atom**".

"Granted, **we have spent many billions of dollars on this**, and we are already close to what Russians call self-sufficiency. **In four years, we and our allies have received fifteen billion dollars worth of various strategic raw materials, hundreds of tons of silver, gold, precious stones, etc. For non-existent projects, over twenty thousand tons of aluminum, two thousand tons of cesium, beryllium, strontium, etc**. have been transferred to us for negligible amounts. Many of our military and businessmen did not believe in the success of the upcoming operations. And in vain. **By shaking the ideological foundations of the USSR, we managed to bloodlessly bring out of the war for world domination a state that is America's main competitor…"**

"In the next decade, the following problems will have to be solved: **the dismemberment of Russia into small states through inter-regional wars**, similar to those organized in Yugoslavia; **the final collapse of the Russian military-industrial complex and the army; the establishment of regimes in the republics that broke away from Russia, which we need**".

The West will not tolerate a strong, sovereign Russia and will do everything to preserve its "vassal" position. And, in fact, all stages of Vladimir Putin's presidential activity represented **a single process of strengthening the national sovereignty of the country after he realized this fact**.

"The West has overlooked the main thing – the Russian president has decided to turn away from the West **by virtue of his own ideas**, to turn Russia away from the West **conceptually and ideologically"**[46].

[45] Karaulov A.* Bill Clinton's report on how the U.S. plundered Russia's resources in the 1990s. Available at: https://ruskline.ru/video/2019/aprel/20/doklad_billa_klintona_o_tom_kak_ssha_razvorovyvali_resursy_rossii_v_90h/

* Included in the register of foreign agents.

[46] Remchukov K. What we will have after the talks between Trump and Putin. Available at: https://www.ng.ru/politics/2025-02-02/1_9183_negotiation.html

KEY CHALLENGES FACING VLADIMIR PUTIN AT ALL STAGES OF HIS PRESIDENTIAL TERMS[47]:

"During Vladimir Putin's first premiership and first presidency (1999–2004), **the main challenge for him was the preservation of the Russian state and the formation of a capable centralized administrative apparatus in opposition to supporters of the oligarchic model and terrorist attacks.** At the same time, in foreign policy, the Russian elites tried to implement a strategy of joining a recognized club of world powers **on their own terms**".

"Putin's second presidential term (2004–2008) was a period of intra-elite consolidation, the greatest economic success and at the same time **increasing tension in relations with the West** against the background of a series of 'color revolutions' around the perimeter of the country, the expansion of NATO to the East, which **led first to a public crisis in relations (2007 Munich Speech), and then and to the Russian-Georgian war** (2008)".

"The power tandem of Vladimir Putin and Dmitry Medvedev (2008–2012) became a time of searching for a new model of the country's development and its role in the global world order. Among other things, options were being explored for a 'reset' of relations with the Collective West, including the United States, combined with modernization aimed at further integration into the global market, or the sovereignization of the political and economic system. A combination of factors prompted the choice of the second option and the return to the presidency of Vladimir Putin as its author. **These include the global financial crisis, a series of coups in the East under the general brand of the Arab Spring, the violent overthrow of the regime in Libya and the chaos that followed in that country.** Putin's team was convinced of the correctness of the decision they had made because then the mass unrest in Russia in 2011–2012 followed, which caused the **deepest distrust of Putin's team in the Western-oriented part of the Russian elite".**

"Nevertheless, Putin began his third presidential term (2012–2018) not with foreign policy activity, but with a large-scale social reversal, expressed in the so-called May decrees. **However, the 2014 Euromaidan forced them to focus on responding to a full-scale external challenge".**

"By the beginning of Putin's fourth term (2018–2024), when it seemed that the unfavorable foreign policy environment had stabilized, the challenge of updating the system and a certain voter fatigue became key. And the 2024 campaign took place in a **hot phase of conflict with the West and its proxies**".

Vladimir Putin's fifth presidential term (2024 – present): "In his speeches delivered to the public, to the elite, Vladimir Putin adheres to the organic non-verbal image of a "Warrior Ruler", showing that he does not so much intend to destroy the existing system of international relations, as to modernize it and make it more fair…

In domestic politics, every year Vladimir Putin acquires completely new features of the archetypal image of a "Creator" – **a person who creates a new world order in which Russia will have a completely new role, and creates new rules of the game within the country and a new elite.… It was the actions of Russia and its leader that exposed the contradictions that had accumulated over the years in the old world order".**

[47] Dynamics of Vladimir Putin's image: From a Warrior to a Ruler-Creator: Report. Minchenko Consulting. October 2024. P. 3.

The above excerpts from the Minchenko Consulting report allow us to say that the challenges and threats to national security that Vladimir Putin had to face throughout his presidential terms were numerous. They emerged **consistently, systematically and were of a complex nature**, manifesting themselves not only in the international political arena, but also inside the country through the activities of the "fifth" and "sixth" columns closely linked to the West (organizationally, financially, ideologically)[48]. Moreover, many (if not most) of these challenges were created by the hands of the West itself, quite logically following its officially stated strategic goal in foreign policy – to contain Russia's development[49].

The West's unwillingness to build relations with Russia as a full-fledged sovereign partner, and the ability to see it only as a colony that has resigned itself to this geopolitical status, has predetermined the nature of relations between the two countries over the past 25 years. In this historical context, it is quite understandable why the SMO, which was originally launched as a means to *"protect people, first of all, to protect Russia itself from those threats that are emerging on the territories adjacent to us that had been our own throughout the history"*[50], has ultimately become a mechanism and a tool for comprehensive transformation of the country: without internal changes it is impossible to get out of the "liberal fog". Therefore, in the internal life of our country against the background of the SMO certain changes are taking place in very important and key areas: legislation, value orientations, education of the younger generations, etc.

"What are we fighting for? Is it only for the lands that were torn away from the Russian world and the humiliated brothers? Of course, not only for that. **The front of the SMO, while it is operating, generates a second front within Russia, the front of self-purification. And this battle, no less important for our fate, is taking place in the depths of Russia, in its capitals...**

The main result of the SMO, the main task within Russia, is the renewal of the elites, moving away from cronyism to its service class people type"[51].

[48] "The 'fifth' column is 'radical anti-state figures; a number of media and hotel figures who have the status of foreign agents. The 'sixth' column is 'liberals and Westerners who occupy a high position in the state – in the hierarchy, government, economy. They are no better than the fifth column. They also consider Russia a periphery of Western civilization, also despise the people and the state, are as cynical about Russian history and can't wait to return to the blessed 1990s" (Source: Dugin A. The sixth column in power is not comparable to the Russian future. Available at: https://izborsk-club.ru/21721?ysclid=m7068c70fp389721203).

[49] Countering America's Adversaries Through Sanctions Act (CAATSA) – a U.S. federal law imposing additional sanctions on Iran, North Korea and Russia. The law was approved by the 115th U.S. Congress, by a 98 to 2 vote in U.S. Senate, and signed into law on August 2, 2017 by U.S. President D. Trump.

[50] V. Putin. Meeting with students as part of a visit to the Lomonosov cluster of the MSU Innovation Science and Technology Center "Vorobyovy Gory", January 25, 2023. Available at: https://iz.ru/1460034/2023-01-25/putin-nazval-tceliu-svo-zashchitu-rossii-i-grazhdan-strany

[51] Averyanov A. What we are fighting for. To the 10th anniversary of the Russian Spring. Available at: https://izborsk-club.ru/25702?ysclid=lx4fa2xiei532116915

The size of the country's territory and population are changing. Russia's area with the new territories[52] within their boundaries from February 2022 increased by 108 thousand square kilometers[53]; "the projected population in the new constituent entities of Russia as of January 1, 2024 was determined to be 3,227,429 people"[54]. These data were published in the draft budget of the Federal Compulsory Medical Insurance Fund for 2024 and for the planning period of 2025 and 2026[55].

Russian legislation is changing. The changes affect the very foundation of the Russian state and society: language, culture, system of values, quality of younger generations, foundations of Russia's position in the international arena, and so on[56].

Moreover, the format of this paper does not allow us to provide information on all the regular, daily management decisions aimed at supporting SMO participants and their families; socio-economic support of the general population (primarily families with children); fighting against foreign agents; strengthening the Russian economy under sanctions and many other important areas (we have been monitoring them since June 2022, i.e. more than two years already)[57]; Insert 2 shows the data from the next round for the period December 18, 2024 through February 13, 2025).

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[52] Federal constitutional laws on the admission to the Russian Federation and the formation of new constituent entities within the Russian Federation – the Donetsk People's Republic, Lugansk People's Republic, Zaporozhye Region, Kherson Region – were signed by the President of the Russian Federation on October 5, 2022.

[53] Shaipova M. One for all: Russia admitted new territories. Available at: https://iz.ru/1403643/mariia-shaipova/odna-dlia-vsekh-rossiia-priniala-novye-territorii

[54] The authorities for the first time named the number of Russians in the new regions. Available at: https://www.rbc.ru/economics/29/09/2023/6516e5449a79477c35e5f12d?ysclid=m6qh805sid422551338

[55] Legislative support system. Draft Law 4448556-8 "On the budget of the Federal Compulsory Medical Insurance Fund for 2024 and for the planning period of 2025 and 2026". Available at: https://sozd.duma.gov.ru/bill/448556-8

[56] See, for example:

- ✓ Federal Law 255, dated July 14, 2022 "On control over the activities of persons under foreign influence",
- ✓ Presidential Decree 809, dated November 9, 2022 "On approval of the principles of state policy for preserving and strengthening traditional Russian spiritual and moral values",
- ✓ Presidential Decree 229, dated March 31, 2023 "On approval of the Foreign Policy Concept of the Russian Federation",
- ✓ Presidential Decree 314, dated May 8, 2024 "On approval of the fundamentals of state policy of the Russian Federation in the field of historical education", etc.

[57] The first issue of the monitoring is presented in the article: Ilyin V.A., Morev M.V. (2022). A difficult road after the Rubicon. *Economic and Social Changes: Facts, Trends, Forecast*, 15(3), 9–41.

Insert 2

The monitoring of regulatory legal acts (laws, decrees) signed by the RF President in the period from December 18, 2024 to February 13, 2025[58]

MEASURES TO SUPPORT SMO PARTICIPANTS AND THEIR FAMILY MEMBERS, TO DEVELOP THE MILITARY-INDUSTRIAL COMPLEX, MEASURES RELATED TO MOBILIZATION, ORGANIZATION OF MARTIAL LAW, INCREASE IN THE ANTI-TERRORIST PROTECTION OF FACILITIES

December 26 – Federal Law "On Amendments to the Labor Code of the Russian Federation". Amendments have been made to the Labor Code, providing for the extension of labor guarantees established for members of the SMO to employees sent to serve in the Rosgvardiya under mobilization.

December 28 – Federal Law "On Amendments to Article 331 of the Criminal Code of the Russian Federation and the Code of Criminal Procedure of the Russian Federation". Criminal liability is provided for the commission of crimes against military service by citizens staying in volunteer formations.

December 28 – Federal Law 510 "On Amendments to the Criminal Code of the Russian Federation and the Code of Criminal Procedure of the Russian Federation". Criminal liability is established for assisting the enemy in activities deliberately directed against the security of the Russian Federation, the jurisdiction of a criminal case on such a crime is determined, and confiscation of property obtained as a result of the commission of this crime is provided. The concepts of "enemy" and "defecting to the enemy's side" are being clarified, as well as the grounds for exemption from criminal liability for committing a number of crimes against the foundations of the constitutional order and the security of the state.

December 28 – Federal Law 514 "On Amendments to the Criminal Code of the Russian Federation". The Criminal Code of the Russian Federation has been amended to increase penalties in the form of imprisonment for involving minors in crimes or antisocial acts. Increased responsibility is provided for such acts in cases where they are committed using information and telecommunication networks, in relation to two or more minors, or in relation to a person under the age of 14.

February 13 – Federal Law 8 "On Amendments to Article 1 of the Federal Law 'On Suspension of the Second Part of Article 43 of the Law of the Russian Federation, 'On Pension Provision for Persons who have Served in Military Service, Service in Internal Affairs Bodies, the State Fire Service, bodies for the Control of Trafficking in Narcotic Drugs and Psychotropic Substances, Institutions and the Bodies of the Penal Enforcement System, the Troops of the National Guard of the Russian Federation, the Bodies of Compulsory Execution of the Russian Federation, and Their Families'". It is established that the amount of monetary allowance taken into account when calculating the pensions of persons who have served in the military, service in the internal affairs bodies, the State Fire Service, bodies for the control of trafficking in narcotic drugs and psychotropic substances, institutions and bodies of the penal enforcement system, the troops of the National Guard of Russia, enforcement agencies of the Russian Federation, and their families Starting from January 1, 2025, it amounts to 93.59 percent of the amount of the specified monetary allowance. This change will make it possible to increase the pension amount for these individuals by 9.5% from January 1, 2025 (relative to the pension amount as of January 1, 2024).

[58] This insert is a continuation of the monitoring of the most important regulatory legal acts signed by the President of the Russian Federation, which we have been conducting since June 2022 (the first issue of the monitoring is presented in the article: Ilyin V.A., Morev M.V. (2022). A difficult road after the Rubicon. *Economic and Social Changes: Facts, Trends, Forecast*, 15(3), 9–41).

Continuation of Insert 2

MEASURES TO PROTECT INFORMATION SECURITY, REGULATE THE ACTIVITIES OF FOREIGN AGENTS, AND UPBRING AND EDUCATE THE YOUNGER GENERATIONS

December 27 – Decree 1120 "Issues of the Interdepartmental Commission on Historical Education". A new Regulation on the Interdepartmental Commission for Historical Education has been approved. The Interdepartmental Commission on Historical Education is a coordinating and advisory body under the President, formed in order to coordinate the work of subjects of the state policy of the Russian Federation in the field of historical education aimed at the implementation of this policy. The tasks of the interdepartmental commission and its powers have been adjusted. The composition of the Interdepartmental Commission on Historical Education and the composition of its presidium have been approved.

December 28 – Federal Law 520 "On Amendments to the Federal Law on Control over the Activities of Persons under Foreign Influence". A special procedure is being introduced for foreign agents to receive funds from the alienation and leasing of real estate and vehicles, remuneration and other payments in connection with the alienation or use of the exclusive right to a result of intellectual activity or a means of individualization, as well as income in the form of interest on deposits (account balances) in banks, income from equity participation in organizations. A foreign agent has the right to receive these incomes only by crediting them to a special ruble account, which is opened with an authorized bank and the regime of which is established by a decision of the Board of Directors of the Central Bank of the Russian Federation. A foreign agent is obliged to inform their counterparties about the availability of this status for obligations providing for the payment of these incomes. Information about the details of a special ruble account is included in the register of foreign agents and posted on the official website of the authorized body.

December 28 – Federal Law 501 "On Amendments to the Criminal Code of the Russian Federation". The Criminal Code of the Russian Federation has been amended to strengthen criminal liability for involving minors in committing crimes or antisocial acts (alcohol and intoxicating substances, vagrancy and begging) committed: – using the Internet; -–in relation to two or more minors; – in relation to a person under the age of 14. We are talking about the criminal liability of adults.

December 28 – Federal Law 506 "On the Russian Academy of Sciences, Reorganization of State Academies of Sciences and Amendments to Certain Legislative Acts of the Russian Federation". The role of the Board of Trustees in the RAS management system is consolidated. The Board of Trustees of the Russian Academy of Sciences will consider issues related to the promotion of the most important scientific achievements and the use of the results of strategically significant scientific research ... the Board of Trustees of the Russian Academy of Sciences also includes organizational issues related to the activities of the Academy. The Board of Trustees of the Russian Academy of Sciences is headed by the President of the Russian Federation, who forms the composition of the Board, taking into account the proposals of the Presidium of the Russian Academy of Sciences.

December 28 – Federal Law 517 "On Amendments to Certain Legislative Acts of the Russian Federation". Foreigners will no longer be able to obtain the status of a native speaker of the Russian language and related preferences (previously, having confirmed this status, they could apply for a residence permit (residence permit) and citizenship of the Russian Federation).

For persons with relatives in a direct ascending line who were born or permanently resided in the territory belonging to the Russian Empire or the USSR (within the border of the Russian Federation), a simplified procedure for issuing a residence permit is provided. The deadlines for obtaining a residence permit by qualified specialists have been adjusted. They can only apply for a residence permit, and simplified citizenship is not provided for them.

End of Insert 2

Persons who voluntarily renounce Russian citizenship will be able to stay in Russia for 90 days. They can obtain a residence permit in a simplified manner. Those who have lost their citizenship due to submitting forged, forged or invalid documents, as well as because they knowingly provided false information on the basis of which citizenship was obtained, will have to leave the country within 15 days. The possibility of obtaining a residence permit for such people is not provided. In addition, foreign citizens or stateless persons whose information is included in the register of controlled entities will not be able to register as individual entrepreneurs.

December 28 – Federal Law 550 "On Amendments to the Federal Law on Youth Policy in the Russian Federation". The list of main directions of youth policy has been supplemented by such areas as "formation of youth based on traditional Russian spiritual and moral values", "preservation and strengthening of traditional family values and family lifestyle among youth", "patriotic and spiritual and moral education of youth", etc.

December 28 – Decree 1124 "On Approval of the Strategy for Countering Extremism in the Russian Federation". The new strategy takes into account the peculiarities of the current political situation. The list of basic concepts of the Strategy is supplemented by "xenophobia" and "Russophobia". The definition of "financing extremist activities" is included, indicated by both internal and external extremist threats. One of the main sources of threats of extremism for Russia is the widespread spread of the idea of neo-Nazism, which originates from the territory of Ukraine. Among the internal extremist threats, there is also an "unfavorable situation with illegal activities of migrants. It provides for the possibility of involving 'civil society institutions, including socially oriented non-profit organizations and individuals' in countering extremism".

January 16 – Decree 26 "On the Development of Infrastructure to Support Non-Profit Organizations". In order to develop the infrastructure for supporting non-profit organizations, autonomous non-profit organizations "School of Management of Non-Profit Organizations of the Presidential Grants Foundation" and "Center for the Development of Digital Services of the Presidential Grants Foundation" are being created.

MEASURES TO PROVIDE SOCIO-ECONOMIC SUPPORT TO THE GENERAL POPULATION, STRENGTHEN THE COUNTRY'S ECONOMY, INCLUDING IN THE INTERNATIONAL ARENA

December 26 – Federal Law 486 "On Amendments to the Urban Planning Code of the Russian Federation and Certain Legislative Acts of the Russian Federation". The federal law is aimed at improving the mechanism of integrated territorial development and legal regulation of other urban planning relations. It is envisaged that the implementation of projects for the integrated development of territories should be carried out simultaneously with the development of their social infrastructure. The requirements for the content of standards for urban planning design, construction control, and integrated territorial development are being clarified.

December 26 – Federal Law 494 "On Amendments to Certain Legislative Acts of the Russian Federation". According to the federal law, certain temporary measures aimed at ensuring the stability of the Russian economy in the face of external sanctions pressure are transferred to the permanent category. In particular, the opportunity to exchange private land plots for state or municipal ones in order to implement large-scale investment projects or accommodate social infrastructure facilities has become indefinite. The regions are allowed to establish cases of preparation of draft general plans of settlements, municipal and urban districts, draft amendments to these plans without holding public discussions or public hearings.

In addition, during the period of the SMO, new forms (elements) of the mechanism of renewal of the ruling elites at all levels of government began to be created. We are talking about the "Time of Heroes" program, which trains new personnel for the system of governance, and the activities of law enforcement agencies (under the leadership of A.R. Belousov, A.V. Bortnikov, A.I. Bastrykin, I.V. Krasnov, etc.) aimed at ousting corrupt officials from the "old" elite, nationalization of large economic assets[59] and legal assessment of the criminal actions of the elites of the 1990s"[60].

First Deputy Head of the Presidential Administration S. Kiriyenko noted: "The program [Time of Heroes] is really working", as evidenced by the growth in the number of applications from participants.

> S. Kirienko: "People with experience and awards became convinced that the program **really works**, and began to actively apply for participation. The share of the Heroes of Russia relative to those who applied in the first wave of registration **increased by 53.5%** and amounted to 51 people, the share of holders of four Orders of Courage increased **18-fold**, three Orders of Courage – **9-fold**, two Orders of Courage – **47-fold**…"[61]
>
> "The total number of applications for the program amounted to **more than 65.5 thousand** … previously, **22 appointments** were made from among the participants of the first stream of training in the program. Among them: Presidential Plenipotentiary in the Ural Federal District A. Zhoga, head of the Tambov Region E. Pervyshov, head of the Movement of the First A. Orlov, and senator of the Russian Federation A. Kondratiev. A number of other program participants are preparing to move to new jobs. Head of the "Time of Heroes" program M. Kostyuk was appointed acting Governor of the Jewish Autonomous Region"[62].

[59] Some examples 2024–2025 (source: Which private companies the prosecutor's office demanded to be handed over to the state. Available at: https://www.rbc.ru/business/29/03/2024/64e3a6769a7947634c7c9f53?ysclid=m70bl305ji348791285):

- ✓ January 15 – lawsuit by the Prosecutor General's Office to forfeit the shares of the car dealer Rolf to the state (January 15, 2024); March 28 – lawsuit by the Prosecutor General's Office to forfeit the shares of pasta producer Makfa JSC to the state;
- ✓ July 3, 2024 – recognition of the business as an extremist association and seizure of assets of vodka brands "Moskovskaya" and "Stolichnaya" in favor of the state;
- ✓ February 19, 2024 – return of the Ivanovo Heavy Machine-Tool Plant to state ownership;
- ✓ February 7, 2024 – lawsuit filed by the Prosecutor Generalэs Office to transfer ownership of JSC Serov Ferroalloy Plant, JSC Chelyabinsk Electrometallurgical Plant and JSC Kuznetsk Ferroalloys to the state;
- ✓ April 5, 2024 – transfer of Ariant Group assets (including Kuban-Vino, the largest wine producer in Russia) into state ownership;
- ✓ November 12 – nationalization of the Moscow Hotel building, including the five-star Four Seasons Hotel Moscow, the Modny Sezon shopping gallery and a complex of apartments located in the building;
- ✓ November 25 – nationalization of business centers and shopping complexes associated with ex-banker Khotin (27 properties with an area of over 1.5 million square meters, including shopping centers Gorbushkin Dvor, Filion, etc.);
- ✓ January 29, 2025 – the Prosecutor General's Office filed a lawsuit with the Arbitration Court of the Tambov Region against MCD Technologies, a Luxembourg-registered company (the essence of the supervisory agency's claims is not disclosed);
- ✓ January 29, 2025 – a lawsuit filed by the Prosecutor General's Office against Domodedovo Group companies and legal entities related to the airport (the lawsuit was filed after a prosecutor's audit of the privatization of a number of facilities at the airport).

[60] It is about the decision of the Constitutional Court of the Russian Federation on October 31, 2024 to remove the statute of limitations on real estate acquired with proceeds of corruption, which, according to lawyers, "gives the right to legalized confiscation of large assets obtained in the 1990s".

[61] Time of Heroes. February 4, 2025. Available at: https://xn--b1aachba0csne6n.xn--p1ai/news/tpost/gxo1eps891-srediuchastnikov-otbora-na-programmu-vr?ysclid=m6t35woxp111493411 (S. Kirienko. February 4, 2025. Meeting of the Public Council of the "Time of Heroes" program).

[62] Ibidem.

Vladimir Putin: "This year [2024], more than three hundred of our comrades-in-arms, veterans of the special military operation, have already received the support of voters in various elections across the country. People trust such candidates, count on their integrity, honesty, professionalism... **the meaning of this request from society is to increase the requirements for the quality and effectiveness of work at all levels of government**, so that municipalities, regional teams, and federal structures include people **for whom a sense of duty and service to society and the country come first...**

I propose and consider it necessary to expand the federal project "Time of Heroes": to launch similar programs in the regions, as has already been done in the Stavropol Territory, the Belgorod, Voronezh, Ryazan, Samara, Tula regions and in the Khanty-Mansi Autonomous Area"[63].

In addition, on the initiative of the President announced on December 14, 2024 at the 22nd Congress of the All-Russian political party "United Russia", programs similar to the "Time of Heroes" are being actively created in all regions of the country.

As experts note, "after Putin's publicly expressed wish to promote the system of personnel selection from front-line soldiers, a competition began in the regions. In December 2024 no less than two dozen projects appeared, in January the race continued, and in February it should apparently come to a close... Moreover, regional authorities have already begun to create special positions for graduates of their schools for the 'new elite'"[64].

However, we should emphasize that so far this mechanism is only at the very beginning, and the tangible results in the form of real renewal of managerial personnel in the country are still quite far away. **In fact, 22 appointments to managerial positions of the first graduates of the "Time of Heroes" program are "a drop in the ocean" against the background of about 759 thousand (according to the data for 2022) managers at all levels of public administration** *(Tab. 1)*. **And how many years it will take to actually launch a process of elite change in the country is still unknown...**

Table 1. Number of employees in government bodies and local self-government bodies of Russia (end of year), thousand people

Government body	2000	2022	2022 to 2000, %
Federal state bodies at the federal level	38.8	54.2	139.7
State bodies of constituent entities of the Russian Federation	192.8	251.5	130.4
Local self-government bodies and election commissions of municipalities	448.0	453.3	101.2
Total in state government bodies (without territorial subdivisions of federal government bodies in constituent entities of the Russian Federation) and local self-government bodies	**679.6**	**759.0**	**111.7**

Source: Number of employees of state bodies and local self-government bodies by branch of government and level of administration. Rosstat. Available at: https://rosstat.gov.ru/storage/mediabank/Chisl_vetv_vlasti.xls

[63] Vladimir Putin's speech at the 22nd Congress of the All-Russian political party United Russia, December 14, 2024. Available at: http://www.kremlin.ru/events/president/news/75881

[64] Garmonenko D. "The time of heroes" has come in almost all regions. Available at: https://www.ng.ru/politics/2025-02-17/3_9194_regions.html?ysclid=m7bg810c18450274323

Insert 3

A brief overview of Russia's withdrawal from the Bologna education system

The Bologna higher education system has been operating in Russia since 2003. However, according to experts, "**over the 20 years of the Bologna process, the goals set by the Bologna process have not been achieved in Russia:** "Russia has not achieved success in terms of automatic unconditional recognition of Russian diplomas and increasing the competitiveness of universities. It is also difficult to enter the international labor market with a Russian diploma... The previously inherent fundamentality of higher education in Russia has been largely lost..."[65].

In May 2022, the Russian Ministry of Science and Higher Education has announced its intention to withdraw from the Bologna process and give priority to creating its own education system. V. Falkov, Head of the Ministry said: "The Bologna system should be left behind. The future belongs to our own unique education system, which should be based on the interests of the national economy and the maximum space of opportunities for each student".

A specific political initiative to abolish the Bologna education system came from the President of the Russian Federation. On February 21, 2023, in his Address to the Federal Assembly of the Russian Federation, he proposed returning to the traditional basic training of specialists with higher education in our country.

May 12, 2023 Presidential Decree 343 "On certain issues of improving the higher education system" introduced pilot projects for the transition to a three-stage higher education system (participants in the pilot project were the Immanuel Kant Baltic Federal University, MAI, MISIS, Moscow State University of Economics, St. Petersburg Mining University and Tomsk State University).

According to the Decree of the President of the Russian Federation, the following new levels of education will be introduced in Russia:

- ✓ basic higher education with a period of study from 4 to 6 years (replacing bachelor's and specialty degrees);
- ✓ specialized higher education, including master's degree, residency, and internship programs (duration of study from 1 to 3 years);
- ✓ professional – a new level of education, which includes postgraduate studies.

January 7, 2025, the Ministry of Science and Higher Education announced that "the transition of all Russian universities to the updated higher education system is planned from September 1, 2026. By the specified date, the Ministry will prepare and approve the relevant regulatory legal acts"[66].

V. Falkov, head of the RF Ministry of Science and Higher Education, noted that "among the principles of work that will be incorporated into the new model is the strengthening of fundamental principles and high-quality practice orientation"[67]. V. Volodin, Chairman of the State Duma of the Russian Federation, pointed out that abandoning the bachelor's degree and switching to a new higher education system is **"the right step toward improving the quality of education"**[68].

Experts' opinion: "The essence of the Bologna system was unification, that is, all the countries that joined it created a single educational space with the same criteria. In simple words, students who received higher education in Russia could leave for Europe, and their diploma did not lose its value. Thus, graduates of Russian universities could find jobs in Western companies... **Now it will be more difficult to study at universities in Western Europe and the USA**, and it will be difficult to verify a Russian specialist's diploma in Western countries... Among the advantages of the new system, it is worth noting **the focus on the formation of practical skills among students** (especially digital in the light of the development of artificial intelligence systems), more flexible and more responsive to the needs of the modern labor market"[69].

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[65] Tkach N. Moving away from the Bologna system: What will be the new higher school? Available at: https://rapsinews.ru/incident_publication/20230614/308997727.html

[66] Higher education institutions will switch to a renewed education system in 2026. Available at: https://ria.ru/20250107/obrazovanie-1992703583.html

[67] Girlin A. "Basic higher education" instead of bachelor's degree: How education will change in Russia. Available at: https://www.gazeta.ru/social/2025/01/07/20347658.shtml

[68] Ibidem.

[69] Beloborodov A. From September 1, 2026 Russia will abandon the Bologna system of higher education: What possible risks there may be. Available at: https://www.parents.ru/article/s-1-sentyabrya-2026-goda-v-rossii-otkazhutsya-ot-bolonskoi-sistemy-vysshego-obrazovaniya-chem-eto-grozit-obyasnyaet-ekspert/

Insert 4

Some of the recent decisions made in the field of education

✓ According to Federal Law 328-FZ dated **August 8, 2024**, from **March 1, 2025**, an additional list of documentation approved by the Ministry of Education will be introduced for education workers. According to Deputy Prime Minister Dmitry Chernyshenko, the law "is aimed at reducing the paper burden. The number of documents will decrease from 48 to 5"[70].

✓ **February 11, 2025,** the State Duma received a bill banning the retraining of teachers in commercial structures. Teachers will be denied the opportunity to purchase new diplomas at low cost.

✓ **February 18, 2025,** as part of the discussion of the education development strategy, the deputies of the State Duma of the Russian Federation unanimously adopted a resolution containing the following proposals [71]:

- the need to develop a set of measures to create a balanced educational and educational burden on students;
- consolidation of the key role of the teacher in the educational process, digital and distance formats exclusively as auxiliary;
- creation of favorable conditions for the teacher's work, including due to a commensurate documentation and educational load;
- raising the prestige of the teaching profession;
- development of mechanisms to protect teachers from physical and psychological influences, including on the Internet;
- the possibility of transferring schools from the municipal to the regional level;
- formation of a new personnel training system based on the real demand of the market, special attention should be paid to the training of engineers, medical and teaching staff;
- provision of a new format of primary vocational education, providing training of qualified workers;
- free training in all working professions;
- creation of guarantees for the employment of graduates in the acquired profession and specialty;
- retraining of teaching staff and professional development exclusively in state and municipal organizations.

✓ In **March 2025,** the first draft of the Education Strategy until 2030, which has been developed since August 2024, is due to appear.

[70] Volodin urged not to hide the reality in the education sector. Available at: https://www.ng.ru/politics/2025-02-11/3_9190_reality.html?ysclid=m7ee97i9cz870294915; Unified standards, retraining of teachers, updated USE. Available at: https://www.ng.ru/education/2025-02-12/8_9191_school.html?ysclid=m7eea0yapw870086303

[71] The State Duma adopted a resolution on the results of the "government hour" devoted to the elaboration of the Strategy for the Development of Education in Russia. Available at: http://duma.gov.ru/news/60932/

During the period of the SMO, tangible changes in the system of education and upbringing of the younger generations of Russians finally began to take place. The emergence of the All-Russian Public-State Movement of Children and Youth "Movement of the First"[72] (July 2022), introduction in Russian schools of a cycle of extracurricular classes "Talking about Important Things" (from September 1, 2022), a unified history textbook (from September 1, 2023), Presidential Decree 314 of May 8, 2024 "On approval of the fundamentals of the state policy of the Russian Federation in the field of historical education"[73] (which, as A. Dugin noted, was "a radical breakthrough in our historical science and historical education, which until recently had been dominated by Westernism»[74]), abandonment of the Bologna system of education in higher education institutions (from September 1, 2026; *Insert 3*)[75] and many other decisions taken by the State Duma, the RF Government and the head of state *(Insert 4)* – all this was done in the context of the SMO, and all this will certainly change Russian society toward strengthening national identity based on a deep knowledge of national history and understanding of the real civilizational meanings of geopolitical relations rather than formal, artificially introduced "rules".

In the context of the SMO important changes are taking place in the public consciousness of the majority of citizens. This is evidenced by the results of multi-year monitoring studies, including for the last 3 years:

1. In 2022–2024 there was a steady positive trend in the share of people who believe that the head of state is successfully handling challenging issues in the country *(Insert 5.1; Tab. 2)*, such as:

✓ strengthening international positions (5 p.p. growth, from 47 to 52% in 2022–2024);

✓ imposing order (9 p.p. growth, from 41 to 50%);

✓ protecting democracy (12 p.p. growth, from 33 to 45%);

✓ economic recovery, growth of citizens' welfare (13 p.p. growth, from 26 to 39%).

In 2024, their proportion reached the maximum value for the entire period of measurement, starting from 2000, which indicates the growing support of the majority of the population not only for foreign, but also for the internal policy of the President. As we said at the very beginning of the paper (referring to the data from Minchenko Consulting), the image of Putin as a "Creator" is not only "his own perceptions of himself", **but also "a reflection of the expectations and hopes of the majority of the population"**[76].

Table 2. Proportion of people who consider the RF President's actions to address key problems of the country as successful, % of respondents

Key problem	2021	2024	Dynamics (+/-)
Strengthening Russia's international positions	46.6	52.4	+5
Imposing order in the country	40.7	49.7	+9
Protecting democracy, strengthening citizens' freedoms	33.3	44.9	+12
Economic recovery, growth of citizens' welfare	26.0	39.0	+13
TOTAL number of positive / negative changes			4/0
Wording of the question: "How successfully, in your opinion, does the President of the Russian Federation cope with the problems...?"; the question has been asked since 2000.			

[72] Federal Law 261-FZ "On the Russian Movement of Children and Youth", dated July 14, 2022.

[73] http://www.kremlin.ru/events/president/news/73986

[74] Dugin A. Public enlightenment by Russian history. Available at: https://zavtra.ru/blogs/prosveshenie_obshestva_russkoj_istoriej?ysclid=lx2yh660gu546017827

[75] Higher education institutions will switch to a renewed education system in 2026. Available at: https://ria.ru/20250107/obrazovanie-1992703583.html

[76] Dynamics of Vladimir Putin's image: From a Warrior to a Ruler-Creator: Report. Minchenko Consulting. October 2024. 23 p. Available at: https://minchenko.ru/news/news_235.html

2. During the period of the SMO (2022–2024), the share of those who believe that modern Russian society is organized fairly *(Insert 5.2; Tab. 3)* has for the first time acquired a stable trend. In 2024, their share was **the highest for the period from 2015 to 2024 (28%)**.

Of course, we should note that the share of those who hold the opposite point of view is still much larger (51%), but over the three years of the SMO it has decreased (by 9 p.p., from 60% in 2021 to 51% in 2024), while the e of proportion of those who believe that modern Russian society is sooner fair has increased (by 11 p.p., from 17 to 28%).

3. Since 2022, **for the first time in the measurement period (since 2011)**, the dynamics of growth in the share of those who note that Russian society is becoming "more united", that there is more "agreement" rather than "disunity" has acquired a stable trend *(Insert 5.3; Tab. 4)*. Over the last three years (2022–2024), the proportion of those who share this opinion has increased by 10 p.p. (from 27 to 37%), while the proportion of those who hold the opposite viewpoint decreased by 6 p.p. (from 43 to 37%).

Table 3. Proportion of those who believe that modern Russian society is organized fairly, % of respondents

Population group	2021	2024	Dynamics (+/-)
Sex			
Men	16.1	27.5	+11
Women	18.0	27.7	+10
Age			
Under 30	17.1	28.1	+11
30–55	16.8	27.4	+11
Over 55	17.5	27.7	+10
Education			
Secondary and incomplete secondary	12.6	22.6	+10
Secondary vocational	19.4	30.0	+11
Higher	18.9	30.1	+11
Income group			
Bottom 20%	20.2	23.1	+3
Middle 60%	15.5	27.0	+12
Top 20%	19.7	33.8	+14
Region	***17.1***	***27.6***	***+11***
TOTAL number of positive / negative changes in all groups			13 / 0

Wording of the question: "How would you assess the current state of Russian society: is it organized rather fairly or unfairly?"; the question has been asked since 2015.

Table 4. Proportion of those who believe that there is more agreement and cohesion than disagreement and disunity in the modern Russian society, % of respondents

Population group	2021	2024	Dynamics (+/-)
Sex			
Men	26.7	34.7	+8
Women	26.9	38.1	+11
Age			
Under 30	25.7	34.9	+9
30–55	27.5	35.4	+8
Over 55	26.4	38.7	+12
Education			
Secondary and incomplete secondary	20.5	32.9	+12
Secondary vocational	29.9	38.8	+9
Higher	29.9	38.0	+8
Income group			
Bottom 20%	19.9	33.3	+13
Middle 60%	24.1	37.6	+14
Top 20%	34.8	38.6	+4
Region	***26.8***	***36.6***	***+10***
TOTAL number of positive / negative changes in all groups			14 / 0

Wording of the question: "In your opinion, what prevails today: agreement and cohesion or disagreement and disunity in our country?"; the question has been asked since 2015.

4. In 2022–2024 (**also for the first time over the entire period of measurements** conducted by VolRC RAS from 1998 to the present), the trend toward a decrease in the share of people noting the relevance in Russian society of such problems as stratification of the population into rich and poor and social insecurity of citizens has become stable *(Insert 5.4; Tab. 5)*. The latter, by the way, in 2024 showed the minimum value for the whole period from 1998 to 2024 (16%). In general, in 2022–2024, the share of people noting the urgency of the problem of stratification of the population into the poor and the rich in Russia decreased by 6 p.p. (from 32% in 2021 to 26% in 2024); the proportion of those noting the urgency of the problem of social insecurity of citizens decreased by 7 p.p. (from 22 to 15%).

Table 5. Proportion of those who consider the problem of population stratification into the poor and the rich and the problem of social insecurity of citizens as most urgent issues, % of respondents

Stratification of the population into "poor" and "rich"

Population group	2021	2024	Dynamics (+/-)
Sex			
Men	31.4	24.7	-7
Women	32.3	26.2	-6
Age			
Under 30	28.9	27.8	-1
30–55	31.2	23.0	-8
Over 55	34.0	27.8	-6
Education			
Secondary and incomplete secondary	33.9	25.6	-8
Secondary vocational	30.6	24.5	-6
Higher	31.5	26.7	-5
Income group			
Bottom 20%	31.3	23.3	-8
Middle 60%	30.9	24.2	-7
Top 20%	31.0	28.7	-2
Region	***31.9***	***25.5***	***-6***
TOTAL number of positive / negative changes in all groups			10 / 0

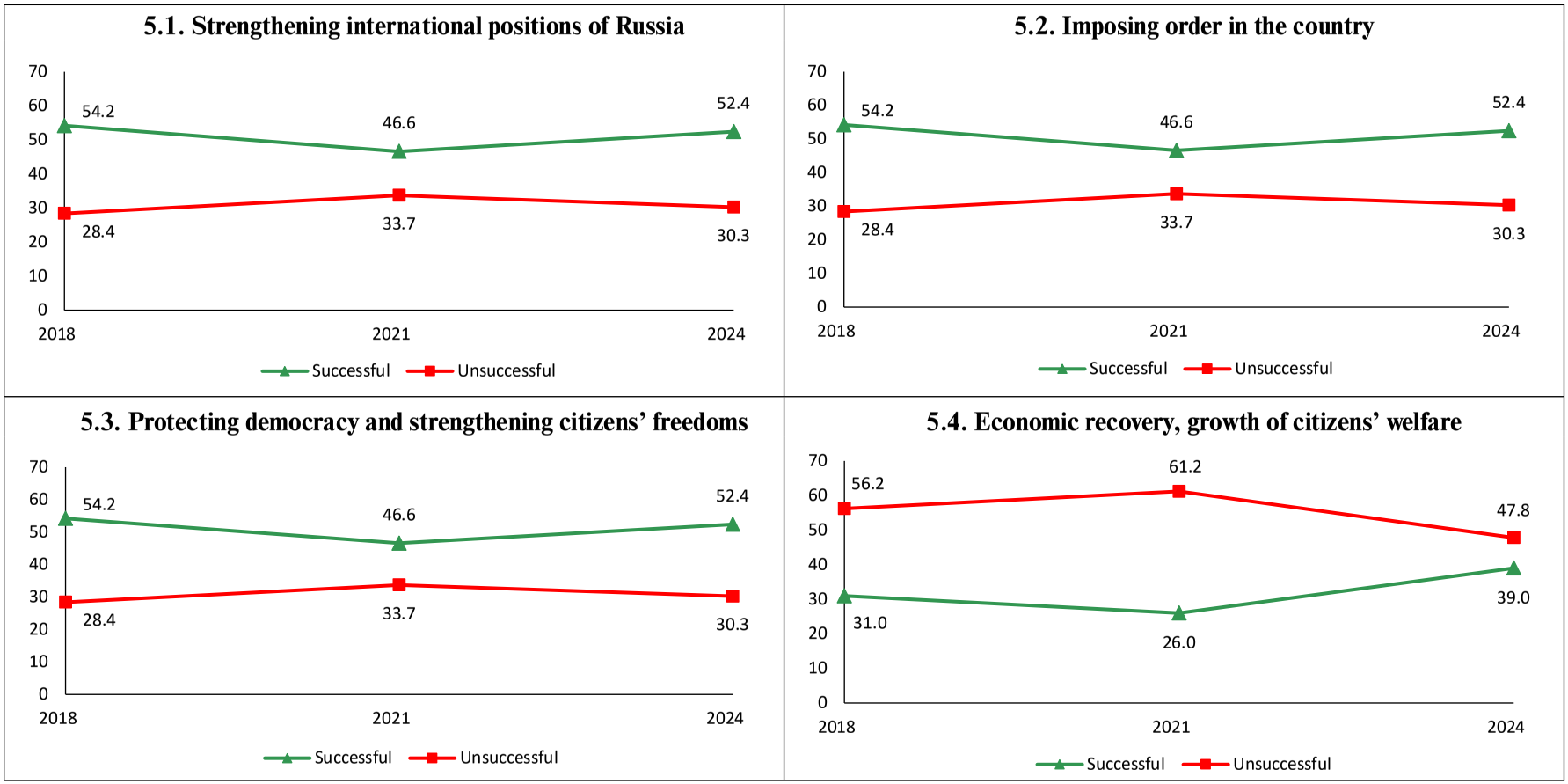
Social insecurity

Population group	2021	2024	Dynamics (+/-)
Sex			
Men	21.5	15.2	-6
Women	22.8	15.9	-7
Age			
Under 30	22.0	13.2	-9
30–55	23.9	15.0	-9
Over 55	20.3	17.2	-3
Education			
Secondary and incomplete secondary	21.7	15.9	-6
Secondary vocational	22.2	14.6	-8
Higher	22.9	16.4	-7
Income group			
Bottom 20%	17.5	13.4	-4
Middle 60%	22.7	15.9	-7
Top 20%	25.5	16.1	-9
Region	***22.3***	***15.6***	***-7***
TOTAL number of positive / negative changes in all groups			13 / 0

Wording of the question: "What problems of modern life do you consider the most acute for the country as a whole?"; the question has been asked since 1999.

Insert 5.1

Dynamics of the assessment of the success of the Russian President's solution of the country's key problems, % of respondents



Wording of the question: "How successfully, in your opinion, does the President of the Russian Federation cope with the problems...?; the question has been asked since 2000.

Following the results of the three years of the SMO, the share of people who consider the President's actions aimed at solving the country's key problems to be successful reached **the highest value for the entire measurement period (since 2000)**:

- ✓ strengthening international positions (52%);
- ✓ imposing order in the country (50%);
- ✓ protecting democracy (45%);
- ✓ economic recovery, growth of citizens' welfare (39%).

Insert 5.2

Assessment of whether society is fair or unfair by various socio-demographic groups, % of respondents

Population group	Fair			
	2018	2021	2024	Dynamics (+/-), 2024 to 2021
Sex				
Men	14.3	16.1	27.5	+11
Women	14.0	18.0	27.7	+10
Age				
Under 30	14.8	17.1	28.1	+11
30–55	13.3	16.8	27.4	+11
Over 55	14.9	17.5	27.7	+10
Education				
Secondary and incomplete secondary	10.0	12.6	22.6	+10
Secondary vocational	15.7	19.4	30.0	+11
Higher	16.5	18.9	30.1	+11
Income group				
Bottom 20%	10.3	20.2	23.1	+3
Middle 60%	14.0	15.5	27.0	+12
Top 20%	21.5	19.7	33.8	+14
Region	***14.2***	***17.1***	***27.6***	***+11***
TOTAL number of positive / negative changes in all groups				13/0

Population group	Unfair			
	2018	2021	2024	Dynamics (+/-), 2024 to 2021
Sex				
Men	59.7	62.3	51.9	-10
Women	61.6	58.5	50.3	-8
Age				
Under 30	55.5	59.6	51.4	-8
30–55	62.2	61.2	50.7	-11
Over 55	61.2	59.3	51.2	-8
Education				
Secondary and incomplete secondary	63.7	61.3	55.0	-6
Secondary vocational	58.5	58.1	48.9	-9
Higher	60.5	62.1	49.4	-13
Income group				
Bottom 20%	56.5	51.0	52.7	+2
Middle 60%	62.5	63.5	53.2	-10
Top 20%	58.4	61.4	44.7	-17
Region	***60.7***	***60.2***	***51.0***	***-9***
TOTAL number of positive / negative changes in all groups				12/0

Wording of the question: "How would you assess the current state of Russian society: is it organized rather fairly or unfairly?"; the question has been asked since 2015.

The share of people who note the fairness of the structure of modern Russian society, over the period from 2021 to 2024 increased by 10–14 p.p. **in all major socio-demographic groups** (except for the most "vulnerable" category – 20% of the least well-off, where, however, no negative changes are noted: 20–23%).

Insert 5.3

Assessment of the degree of agreement and cohesion in modern Russian society in different socio-demographic groups, % of respondents

Population group	More agreement and cohesion			
	2018	2021	2024	Dynamics (+/-), 2024 to 2021
Sex				
Men	26.6	26,7	34.7	+8
Women	22.8	26,9	38.1	+11
Age				
Under 30	25.3	25,7	34.9	+9
30–55	24.7	27,5	35.4	+8
Over 55	24.0	26,4	38.7	+12
Education				
Secondary and incomplete secondary	15.7	20,5	32.9	+12
Secondary vocational	25.3	29,9	38.8	+9
Higher	32.9	29,9	38.0	+8
Income group				
Bottom 20%	18.4	19,9	33.3	+13
Middle 60%	23.6	24,1	37.6	+14
Top 20%	29.5	34,8	38.6	+4
Region	***24.5***	***26,8***	***36.6***	***+10***
TOTAL number of positive / negative changes in all groups				14 / 0

Population group	More disagreement and disunity			
	2018	2021	2024	Dynamics (+/-), 2024 to 2021
Sex				
Men	42.2	44.3	39.6	-5
Women	45.2	41.6	35.1	-7
Age				
Under 30	41.5	39.4	33.0	-6
30–55	43.9	43.6	39.6	-4
Over 55	45.0	43.2	35.6	-8
Education				
Secondary and incomplete secondary	47.5	42.9	34.3	-9
Secondary vocational	42.9	39.9	39.0	-1
Higher	41.3	46.4	38.0	-8
Income group				
Bottom 20%	46.7	49.8	30.5	-19
Middle 60%	44.2	44.1	37.3	-7
Top 20%	39.5	46.8	42.1	-5
Region	***43.9***	***42.8***	***37.1***	***-6***
TOTAL number of positive / negative changes in all groups				13 / 0

Wording of the question: “In your opinion, what prevails today: agreement and cohesion or disagreement and disunity in our country?”; the question has been asked since 2011.

In 2021–2024, the share of those who believe that Russian society is cohesive increased **in all major socio-demographic groups**, especially among people over 55 (by 12 p.p., from 26 to 38%); low- and middle-income groups (by 13–14 p.p., from 20 to 33% and from 24 to 38%, respectively), as well as among people with secondary and incomplete secondary education (by 12 p.p., from 21 to 33%).

Insert 5.4

Assessment of the relevance of the problems of inequality and social vulnerability in different socio-demographic groups, % of respondents

Population group	Stratification of the population into "poor" and "rich"			
	2018	2021	2024	Dynamics (+/-), 2024 to 2021
Sex				
Men	36.5	31,4	24.7	-7
Women	35.4	32,3	26.2	-6
Age				
Under 30	34.7	28,9	27.8	-1
30–55	34.3	31,2	23.0	-8
Over 55	38.6	34,0	27.8	-6
Education				
Secondary and incomplete secondary	35.4	33,9	25.6	-8
Secondary vocational	36.2	30,6	24.5	-6
Higher	35.8	31,5	26.7	-5
Income group				
Bottom 20%	33.9	31,3	23.3	-8
Middle 60%	37.1	30,9	24.2	-7
Top 20%	34.4	31,0	28.7	-2
Region	***35.9***	**31,9**	***25.5***	***-6***
TOTAL number of positive / negative changes in all groups				10 / 0

Population group	Social insecurity of citizens			
	2018	2021	2024	Dynamics (+/-), 2024 to 2021
Sex				
Men	20.1	21.5	15.2	-6
Women	19.6	22.8	15.9	-7
Age				
Under 30	20.1	22.0	13.2	-9
30–55	20.6	23.9	15.0	-9
Over 55	18.8	20.3	17.2	-3
Education				
Secondary and incomplete secondary	18.6	21.7	15.9	-6
Secondary vocational	19.5	22.2	14.6	-8
Higher	21.7	22.9	16.4	-7
Income group				
Bottom 20%	16.3	17.5	13.4	-4
Middle 60%	18.7	22.7	15.9	-7
Top 20%	25.9	25.5	16.1	-9
Region	***19.9***	***22.3***	***15.6***	***-7***
TOTAL number of positive / negative changes in all groups				13 / 0

Wording of the question: "What problems of modern life do you consider the most acute for the country as a whole?"; the question has been asked since 1999.

In the context of the main socio-demographic groups, positive changes are also observed **in all of them**. The share of people noting the relevance of the problems of inequality and social vulnerability of citizens has decreased by about 5–9 p.p. over the three years of the SMO.

Significant changes in the assessment of the problem of inequality are not observed only among representatives of the younger age category (up to 30 years old; 28%) and 20% of high-income (according to self-assessments) strata (29–31%). Also stable are the assessments of people over 55 years of age regarding the relevance of the problem of social insecurity of citizens (17–20%).

T. Voevodina: "Has a new life begun? **It seems to me that a new life is being built, but somehow very cautiously.** Maybe it is necessary, or maybe the leadership does not have a clear understanding of what needs to be done and where certain actions may lead to"[77].

S. Mikheev: "Eyewashing, imitation, self-interest, as well as the work of foreign intelligence agencies, which somewhere planted disinformation, somewhere had embedded agents and formed an opinion that was convenient for them, somewhere tried to cover up objective information with biased information. Is there a problem with the system here? Absolutely. **Are there changes now...? According to some signs, there are movements, but there is no complete and deep change of the situation. A lot of things have been realized, some things have been changed, including personnel, they have become better at protecting their information, but many diseases still remain.** For example, the desire to always report a beautiful picture to the boss. Say whatever you want, but don't upset the boss. This is rather strange... **It reminds me of a disease or an extremely ingrained wrong tradition**"[78].

Thus, the data presented in Inserts 5.1–5.4 suggest that the special military operation has a "serious impact on very many areas of life in Russia"[79]. At the same time, we agree with the assessments of analysts who say that **"the construction of a new life is somehow very cautious and tentative"; "there is no complete deep change in the situation"** (at least not yet).

Indeed, on the external contour, the prospects for our country are still quite vague, which (judging by the assessments of many experts) concerns both the peaceful settlement of the conflict between Russia and the West and the further "post-war" world order. Even after the beginning of some movement[80] in the direction of organizing a personal meeting between Russian President Vladimir Putin and U.S. President Donald Trump, experts note that this "does not mean at all that the Ukrainian problem will be successfully solved soon. The presidents did not discuss the topic of sanctions, recognition of Crimea and four new Russian territories. **There was just a feeling of movement**"[81].

[77] Voevodina T. "And everything came true and did not come true...". Available at: https://zavtra.ru/blogs/i_vsyo_sbilos_i_ne_sbilos_?ysclid=m71hdjlcud558094712

[78] Mikheev S. The Soviet period was replaced by the green sickness. Available at: https://ruskline.ru/news_rl/2024/12/28/sovetskii_period_smenilsya_blednoi_nemowyu

[79] Mostyaev Y.N. (Candidate of Sciences (History), Associate Professor of the Department of General History and International Relations, Yesenin Ryazan State University). Special military operation: Impact on Russia and the world. Available at: https://ruspolitics.site/wp-content/uploads/2023/02.03.2023-ACROP.pdf?ysclid=m706ncl0gz974799613

[80] On February 12 and 15, 2025, at the initiative of the U.S. side, the first (since the beginning of the conflict) official telephone conversations between the heads of state of Russia and the United States took place.

On February 18, official talks between delegations from Moscow and Washington took place in Saudi Arabia for the first time since 2021. The Russian delegation was represented by Foreign Minister Sergey Lavrov, Presidential Aide Yuri Ushakov, and head of the Russian Direct Investment Fund (RDIF) K. Dmitriev. The parties discussed the restoration of the whole range of bilateral relations, but, as experts note, "as for the Ukrainian settlement itself, it is too early to talk about any progress" (source: Samuna L., Kostina A. Face-to-face time: What will be discussed at the first meeting of the Russian and U.S. delegations. Available at: https://iz.ru/1840645/leonid-samuna-anastasiia-kostina/ochnoe-vremya-chto-obsudyat-na-pervoj-vstreche-delegacij-rf-i-ssha).

[81] Does Putin and Trump's conversation mean peace is near (Editorial). Available at: https://www.ng.ru/editorial/2025-02-13/2_9192_red.html

1. *S. Karaganov*: **"The Trump administration currently has no serious reason to negotiate with us on the terms that we have set. War is economically beneficial to the United States..."**[82]

2. *K. Remchukov:* **"Remaining on the basis of realism, it is impossible to count on achieving long-term and solid peace..."**[83]

3. *R. Ishchenko:* "Until now, the majority of the Russian population naively believes that when the SMO is over, there will be a victorious peace like after the Great Patriotic War. In fact, with the end of the SMO, Russia will only get rid of the need to fight and, if it succeeds, it will be able to return the **confrontation with the West to a political, informational and economic format"**[84].

4. *S. Belyaeva:* "Our country is getting rid of excessive dependence on the West, but experts warn that **this trend should not turn into a new unilateral dependence on another serious player (China). Russia in its current state is significantly inferior in terms of overall power to both the United States and China"**[85].

A. Svetlov: "It seems that the overwhelming number of decision-makers at the state and upper corporate levels of administration... are living in a **permanent and growing 'crisis of complexity'**, when, trying to react to changes in the old logic they are accustomed to, they are constantly faced with the fact that the time it takes them to analyze and make a decision is comparable to the time when the situation changes so much that the **developed solution loses its relevance.** It is a situation of **gradually increasing catastrophe for them.** And as what they perceive as a catastrophe increases, **these people will lose their adequacy"**[86].

K. Shakhnazarov: "Russian culture is occupied, they have tightly occupied pop and theater positions and will continue to parasitize. **Three years of the SMO have not changed anything"**[87].

But, more importantly, it is too early to talk about any drastic results in terms of "dispelling the liberal fog" inside Russia. There are still many people in our own public administration system (and those in the highest positions) who have not adapted to the ongoing transformations and dream of "getting everything back to how it was before 2022" *(Insert 6)*.

[82] Karaganov S. Breaking the back of Europe: What Russia's policy toward the West should be. Available at: https://globalaffairs.ru/articles/slomat-hrebet-evrope-karaganov/?ysclid=m7eei5152u371336419

[83] Remchukov K. What we will have after the talks between Trump and Putin. Available at: https://www.ng.ru/politics/2025-02-02/1_9183_negotiation.html

[84] Ishchenko R. Geopolitical results of the SMO. Available at: https://zavtra.ru/blogs/geopoliticheskie_rezul_tati_svo

[85] Belyaeva S. Race for leadership. Available at: https://poisknews.ru/releases/gonka-za-liderstvom/

[86] Svetlov A. Historical alternative. Available at: https://zavtra.ru/blogs/istoricheskaya_al_ternativa

[87] Shakhnazarov K. Three years of the SMO did not change anything. Russian culture is occupied. Available at: https://argumenti.ru/society/2025/01/934231

Insert 6

Examples of inconsistency of actions of ruling elites with the goals of strengthening national sovereignty

"At the beginning of autumn, when the Central Bank raised the rate and the interest on deposits rose substantially, the explanations and talk that the measures were necessary in order to sterilize the money supply were hilarious...**The current monetary leadership without prompting and clear instructions does not know how to do this, it is not surprising that the Central Bank's policy turned out to be predictably ineffective and illogical.** The fight against 'statistical inflation' started in the summer of 2024, when the surge of late 2023 – early 2024 was exhausted, **cannot be explained within the framework of rational logic.**

The assurances voiced on behalf of the Central Bank, seemingly anonymous, that the deposit freeze is absurd, lack the phrases like 'so far', 'at the moment', etc... At the current moment the chances are slim: 10–15%, **but as the situation worsens, and the Central Bank is trying hard to make it worse, the probability will increase. Without a change in monetary policy, the situation will spiral out of control, all the 'permissible' tools are being tried, but they will not bring results"**[88].

December 15, 2024 An environmental disaster has occurred in the Kerch Strait due to the rupture of the hulls of two Volgoneft-class oil tankers.

In an interview to the newspaper *Poisk*, RAS Academician V. Babeshko, head of the Research Center for Forecasting and Prevention of Geo-Ecological and Man-Made Disasters at KubSU, said the following:

*"The losses from the Kerch Strait accident are enormous, and **a significant part of them is due to disregard for science, our proposals and ideas**. As it became obvious, there was considerable **confusion at various levels of Rosneft's management** in this emergency situation... At one time, our cooperation with Priazovneft was quite fruitful. We have developed a way to determine what caused the pollution of seawater, to differentiate its sources such as mud volcanoes or offshore oil production...*

*Perhaps the current situation will prompt the management of Rosneft to return **to the previously rejected proposals** of Kuban State University on the use of the latest mathematical methods obtained only in Russia to create operational high-precision models of the spread and deposition of pollutants in water areas. Moreover, not only in the Black and Azov seas, but also in other areas where both oil transportation routes and oil production sources may be located. Reliable information on **the daily atlas** of sedimentation and advancement of the oil mass from the December accident (taking into account the transformations of pollutants) would be a good help for developing an optimal strategy for the elimination of the accident and assessing the prospects for self-purification of the sea"*[89].

[88] Shkolnikov A. Temperature in the central hospital. Available at: https://zavtra.ru/blogs/temperatura_po_tcentral_noj_bol_nitce

[89] Gromov G. Predictable trouble. Available at: https://poisknews.ru/releases/predskazuemaya-beda/

Continuation of Insert 6

December 20, 2024 – meeting of the State Council dedicated to providing support to families. Here is an excerpt from a speech by Deputy of the State Duma of the Russian Federation Ya. Lantratova:

"A toy is an image that a child grows up with... our popular player who distributes these toys is Mattel, which operates in the United States. ***The biggest selling market is Russia****. So, Mattel has created the country's first transgender Barbie doll toy. In 2022, Mattel transferred a million dollars to support the Armed Forces of Ukraine, and in 2023 it transferred 100 percent of the line of sales of new toys to support the Armed Forces of Ukraine. That is, they sell us alien values, and then they fight against us with this money. And such threats come to children through clothing, music, and other areas"*[90].

December 27, 2024 – excerpts from an interview with the Chairman of the Council for Children's Books of the Writers' Union of Russia N. Nilov to the newspaper *Zavtra*:

"We wanted to understand how a modern children's book works, what happens to it, and what it conveys to young readers. We managed to study 930 books from 186 publishers. Having started by studying the design, circulation and authors, we moved on to the content – ***and were horrified, because 62.8% of the children's books we studied turned out to be destructive. With our work, we have shown a front that has so far gone unnoticed. It turned out that on this front there is no protection, no barrier, no one is resisting****...*

Through research, we have established that there are five recurring destructive themes. It is important to understand that all of them can be intertwined:

- ✓ the first theme is ***betrayal****...;*
- ✓ the second theme that can be traced in children's books today: man is an ***animal, a humanoid beast****...;*
- ✓ the third theme is changing social roles, including the rejection of the 'traditional gender roles' of man and woman...;
- ✓ the fourth theme is ***deviance from the norm***. Society has norms, we have to look after ourselves, look a certain way, behave, socialize. Is it necessary to argue with this? But from the books it follows that this is wrong, because you don't have to conform to anything, you just have to be what you want to be...;
- ✓ and finally, the concluding theme, the fifth one – ***indifference to the future***... To live, to be friends, to socialize, to meet, to solve some tasks and problems, to strive for something, to achieve something – all this is nonsense, it is not important...

There is a broad and purposeful work on reformatting children. It is very important to realize that, in particular, a children's book is a clearly working system of introducing meanings. And all these destructive meanings are introduced through children's literature non-stop, they do not change in any way. No way! These meanings were quietly replicated even before the special military operation, and since 2022 everything has only intensified"[91].

[90] State Council Meeting on December 20, 2024. Available at: http://www.kremlin.ru/events/president/news/75918

[91] Dubianskaya M. Be vigilant! Available at: https://zavtra.ru/blogs/bud_te_bditel_ni51

Continuation of Insert 6

January 12, 2025, the newspaper *Zavtra* published an article about V. Yakemenko[92] (later, on January 31, this story was aired in N. Mikhalkov's program 'Besogon TV'"[93]).

B. Yakemenko is the former head of the Department for Relations with Public Organizations of the Internal Policy Department of the Russian Presidential Administration (2000), founder and leader of the youth movements "Coming Together" and "Nashi" (2000–2013), co-organizer of the annual All-Russian Youth Forum "Seliger" (2005–2014), head of the State Committee for Youth Affairs of the Russian Federation and the Federal Agency for Youth Affairs (Rosmolodezh; 2007–2012). Today he lives in Bavaria, where he bought an old house with a mill and a pond with a total area of 50 hectares for 16 million euro.

Excerpts from an interview with V. Yakemenko:

✓ *"When I was building the Nashi movement, I was a naive guy from Lubertsy* ***who had seen nothing in his life but drugs and gangsters".***

✓ *"It seemed to me that all people were just like me. Well, at the very least, they pretend to be.* ***Crooks. They're just like me. They're just crooks.*** *When scientists came to us and said, 'Do you realize that science is done for the sake of science?',* ***I, as a representative of the government with a budget and the right to distribute****, said, 'Keep whistling. You're going to tell us this now so as to get money from us and not do a damn thing".* ***Because I considered them to be about as much of a crook as I was myself".***

✓ *"If I had not realized acutely in my time that I was an absolute degenerate, and* ***a degenerate working in the government, working in the Kremlin,*** *I would never in my life have been able to understand the little that I have understood to date".*

✓ *"****To me, there is no Russia****. To me, there are 140 million people, internally, in my opinion, extremely desperate, lonely and completely without any idea what to hold on to in their ordinary lives".*

✓ *"I felt really good. But it was always this – **will they or won't they give me a bag of money?** – it was poisoning my existence. I was poisoned by the idea that they might not give it to me, and that I had superiors who might not be happy with me.*

[92] Ivanov A. Yakemenko, who headed youth policy, made a "hell of a lot of money" from it. Available at: https://zavtra.ru/events/rukovodivshij_molodyozhnoj_politikoj_yakemenko_zarabotal_na_etom_adskoe_kolichestvo_deneg

[93] Besogon TV. What threatens the dictatorship of profane? Episode aired January 31, 2025. Available at: https://besogontv.ru/videos/chem-grozit-diktatura-profanov/

Continuation of Insert 6

✓ *[What have you been living on since you left politics?] "**I've put aside a hell of a lot of money. Gold. Not diamonds, gold. I sell it from time to time. Saw off a chunk of it and live".***

✓ *[So today what you did back then you don't believe in, you think it doesn't make sense] "Well it does make sense! **I made a lot of money.** You're talking to me now largely because I had this history behind me. **I built myself a house, and not just one house**. No, why? **It was quite a meaningful endeavor".***

✓ ***"I don't believe in any country".***

✓ ***"Humanity is 100 smart people and the rest are Pavlov's dogs".***

✓ ***"I never read a book until I was kicked out of government".***

✓ ***"It's all about making money".***

Experts' comments:

A. Dugin: "*How could the Kremlin… rely for so long on such cynical globalist thieves? **Who, I wonder, got them at all, dressed them up and elevated them to the heights of power…**? This is a direct humiliation of the President, the people and all those who gave their lives for our Victory in Freedom. Cynical and cold. **Not random. In fact, this is the voice of the Russian elite until 2022. Frankly and monstrously".***

A. Dvoynev, SMO veteran, lecturer at Omsk State Technical University: *"... it is a horror, a real horror to me that **work with young people is still carried out in our country according to the 'canons' that our dear Vasily Yakemenko proposed at the time… Until now, patriotic work in universities is supervised by Rosmolodezh, which calls it the Patriotic Track'".***

End of Insert 6

February 4, 2025, the Russian Union of Industrialists and Entrepreneurs (RSPP) hosted a round table entitled "Foreign labor on the labor market in the Russian Federation: Balancing the interests of business, society and the state" with the participation of representatives of the leadership of the All-Russian Public Organization "Delovaya Rossiya" and the All-Russian Public Organization of Small and Medium Enterprises "Opora Rossii". The event discussed "issues of attracting foreign labor to the Russian labor market in the context of personnel shortage"[94]. The proposed measures include the following:

- ✓ abolishing regional restrictions on the recruitment of migrants;
- ✓ allowing migrants to work under a patent in different regions of the country;
- ✓ allowing migrants to study Russian on the territory of Russia with the creation of appropriate conditions for "effective adaptation";
- ✓ cancelling the expulsion of illegal immigrants at the request of a company, etc.

K. Malofeev, Chairman of the Board of Directors of "Tsargrad" Group of Companies, noted: "*Russian business enthusiasts represented by the Russian Union of Industrialists and Entrepreneurs, Delovaya Rossiya, and Opora Rossii have proposed* ***liberalizing migration legislation****... business associations want* ***not only to bring even more migrant workers to Russia, but also to take over some government functions. This can only lead to chaos and increased corruption"***[95].

February 18, 2025, the press service of the Investigative Committee of the Russian Federation reported that "in 2024, the number of decisions on the initiation of criminal cases of crimes related to the implementation of national projects **doubled**. Almost half of them are in the field of demography; 678 criminal cases against 842 defendants have been transferred to the courts, which is also almost twice as many as in 2023"[96]. We should note that earlier (on October 29, 2024), at an operational meeting on the investigation of crimes in the field of the implementation of national projects, Chairman of the Investigative Committee of the Russian Federation A. Bastrykin announced that "the investigative bodies of the Investigative Committee of Russia **have transferred almost one and a half thousand criminal cases against 1,800 defendants to the courts in 5 years"[97].**

[94] Foreign labor force on the labor market in the Russian Federation: Balance of interests of business, society and the state. RSPP Press Release. February 4, 2025. Available at: https://rspp.ru/events/news/inostrannaya-rabochaya-sila-na-rynke-truda-v-rf-balans-interesov-biznesa-obshchestva-i-gosudarstva-67a1ba6b2a11b/

[95] Ivanov A. Major business lobbyists put forward proposals to liberalize migration legislation. Available at: https://zavtra.ru/events/krupnejshie_biznes-lobbisti_vidvinuli_predlozheniya_po_liberalizatcii_migratcionnogo_zakonodatel_stva

[96] In the Russian Federation, the number of cases in the implementation of national projects in 2024 has doubled. Available at: https://tass.ru/proisshestviya/23172575?ysclid=m7ai4f0c3j41569284

[97] The Chairman of the Investigative Committee of the Russian Federation held an operational meeting on the investigation of crimes in the sphere of national project implementation. Available at: https://sledcom.ru/news/item/1925289/

Thus, the development of the situation at the current moment so far arouses very cautious optimism both on the external political track (in terms of reaching stable agreements with the American side, ending hostilities in the SMO zone and establishing new rules of the world order that suit all key participants in the conflict) and on the domestic political arena (in terms of ridding the public consciousness, primarily the elite groups, of the "liberal fog" of previous decades).

The dominance of liberal dogmas in Russia's ruling elites suggests that Russia (as S. Karaganov emphasizes) is still "not self-determined"[98], **and it will be extremely difficult to occupy and (most importantly) maintain a worthy place in the new multipolar world if Russia possesses superiority only in the field of weapons, and lacks a clear idea, ideology, and is "inferior in overall power to both the United States and China"[99]...**

Nevertheless, the very fact that in the first three years of the SMO, Russia withstood complex (economic, political, military, informational) pressure from the countries of the entire NATO bloc, did not succumb to numerous provocations from the "Kiev regime" and did not allow the world to "slide" into the chaos of a nuclear conflict is **the unconditional merit of the head of state and, perhaps, the main result that can be summed up after three years of his career.**

In conclusion, we note that during 25 years in office as President, Vladimir Putin has gone from the image of a "Warrior" defending the country from Chechen separatists and "a hidden, veiled intervention aimed at subordinating it [Russia] to the interests of other countries"[100] to the image of a "Creator", without whom (and therefore without Russia's participation) it is difficult to imagine the formation of new rules of the current world order and almost impossible to imagine the functioning of the internal system of public administration.

According to experts, "the President considers his activities in the historical context", and therefore the next six years will be a very "important period" for him...

> "Putin's foreign policy... was changing – **as he himself was changing, as Russia itself was changing. It did not wobble from side to side, did not twitch in search of short-term benefits or forever lost, but evolved from weak to strong, from inexperienced to experienced, from ordinary to wise"**[101].
>
> "The President of the Russian Federation considers his state **activity in the historical context,** and this time is quite long... **The next six years are an important period for him"**[102].

What will the current political cycle (2024–2030) bring with it? The goals and objectives for the future are defined by the Presidential Decree "On the national development goals of the Russian Federation for the period up to 2030 and for the future up to 2036"[103]. Vladimir Putin has profound experience in managing such a huge and complex country as Russia; there is a close-knit team of the RF Government headed by Mikhail Mishustin, the

[98] Karaganov S. Speech in the program "Yalta 2.0. Big History". ORT. Episode aired on February 9, 2025. Available at: https://www.1tv.ru/shows/bolshaya-istoriya/vypuski/yalta-2-0-bolshaya-istoriya-vypusk-ot-09-02-2025?ysclid=m71mll57h8356457652

[99] Belyaeva S. Race for leadership. Available at: https://poisknews.ru/releases/gonka-za-liderstvom/

[100] Vladimir Putin's speech at the Valdai International Discussion Club meeting on November 7, 2024. Available at: http://www.kremlin.ru/events/president/news/75521

[101] Dynamics of Vladimir Putin's image: From a Warrior to a Ruler-Creator: Report. Minchenko Consulting. October 2024. P. 4. Available at: https://minchenko.ru/news/news_235.html

[102] How to ensure the sustainability of the system in Russia. Available at: https://www.ng.ru/editorial/2024-05-08/100_08052024_red.html

[103] On national development goals of the Russian Federation for the period up to 2030 and in the perspective up to 2036: Decree 309, dated May 7, 2024. Available at: http://www.kremlin.ru/events/president/news/73986

"power bloc" under the leadership of A.R. Belousov, the State Duma under the chairmanship of V.V. Volodin. All of them have already proven themselves in practice during the COVID-19 pandemic and in the three years since the start of the special military operation.

Together, they have a lot to rebuild in the country and at the same time correct the mistakes made in the previous decades of the "liberal fog". And to do this, first of all, we have to decide "what do we want? Who do we want to be in the future world and, consequently, what will the world be like for us?"

"We need to understand what we want.

And in order to understand what we want, we must define ourselves.

Until the end.

We haven't fully determined who we are yet.

We don't have a state idea, a state ideology...

"We need to understand who we want to be in the future world and, accordingly, what the world will be like for us"[104].

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[104] Karaganov S. Speech in the program "Yalta 2.0. Big History". ORT. Episode aired on February 9, 2025. Available at: https://www.1tv.ru/shows/bolshaya-istoriya/vypuski/yalta-2-0-bolshaya-istoriya-vypusk-ot-09-02-2025?ysclid=m71mll57h8356457652

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Evolution of Colonial and Neocolonial Models in Geopolitical Dominance

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Abstract. The paper considers the architecture of modern neocolonialism. To this end we put forward simple structural and graphical models of traditional (colonial) and modern (neocolonial) systems, whose comparison reveals their differences. Further, we systematize comparative features of two dominance systems – colonial and neocolonial. We introduce the concept of colonial cycle, which means power castling – the process when power shifts from the mother country to its colony; a typical example is the relationship between the United States and the UK. We propose a structural and graphical model of a multipolar world, which highlights alliances of countries and indirect methods of struggle that States engage in so as to gain influence in their regional segments of the geopolitical system. We reveal the objective and subjective drivers of neocolonial castling: the scale effect; the balance of power effect, formalized as a structural balance; the globalization saturation effect that generates a "globalization / local culture" cycle; the political leader effect; economic patriotism. We put forward an expanded model of state success in the context of neocolonialism; this model, in addition to internal social achievements, takes into account the external effect in the form of political sovereignty. We show that many international comparisons lose their relevance within the framework of this model. A typical example of a false but well-established narrative based on a narrowed model of state success is the notion of South Korea's more dynamic development compared to North Korea. We consider a modification of the extended model of state success using N. Machiavelli's militaristic model as an example. The cognitive significance of the concept of colonial cycles in the context of geopolitical turbulence is discussed.

Key words: colonialism, neocolonialism, colonial cycle, country's success.

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Introduction

According to G. Arrighi, "the long twentieth century" (Arrighi, 2006) dramatically reformatted the geopolitical space of the planet. However, it is only now becoming partly clear to what extent the twentieth century was long. The past century has witnessed many qualitatively new things that are now continuing and becoming mature. Neocolonialism with all its attributes should be distinguished among such phenomena. Its features will be discussed in more detail below; for now, it is enough to point out the following: the primordial forms of these phenomena existed back in ancient times, but they were able to reach maturity only in the wake of the grandiose scien hievements, technological breakthroughs and military disasters of the 20th century. This circumstance urges us to look back upon the events of the previous century, which we will rely on to reveal the essence of the issues raised.

However, the 21st century has contributed to the crystallization of neocolonialism too. The changes that accumulated over 125 years have reached a critical point when they cannot be disguised and become visually observable. The aim of the study is to reveal main features of the colonial and neocolonial models of geopolitical dominance in historical retrospect, highlighting their main characteristics and features. The novelty of the approach lies in designing our own structure of the effects under consideration, clarifying and revising the content of the main elements of the theoretical concept, as well as revealing the mechanisms of the modern model of the world order.

Architecture of colonial and neocolonial governance regimes

The Age of Discovery gave rise to the era of colonialism, when *dominant countries* (suzerain countries) *formally* (de jure) and *actually* (de facto) exercised ownership and administration of their *colonies* (vassal countries). In turn, after the Second World War, the last phase of the destruction of this relatively simple governance system began, ending in the 1960s, when almost all countries acquired the status of political sovereignty. However, formal elimination of the colonial system was almost immediately followed by the onset of neocolonialism. The first president of Ghana Kwame Nkrumah noted that the "end of empire" was accompanied by the flourishing of other means of enslavement in the former colonies: for example, the profits of British tin companies in Ghana reached 400%, and the dividends of British diamond industry shareholders amounted to about 350% (Nkrumah, 1965). Thus, former colonies were still being exploited, but in a slightly different format. These facts prove the establishment of *neocolonialism* around 1960, when colonies, having become formally (de jure) sovereign States, actually (de facto) remained under the patronage of the leaders of the world economic system. At the time, the old colonial model of the world was replaced by a neocolonial one, and the process of governing neocolonial countries by new empires became largely *invisible*. Consequently, the new period of the geopolitical system is characterized by *covert (implicit or indirect) governance* of the new vassal countries, which are called the "third world", by leader countries. In other words, the essence of relations between countries has remained the same; only the form has changed, becoming less explicit and more camouflaged and sophisticated.

Currently, such an understanding of colonialism and neocolonialism corresponds to well-established ideas, the range of which is rather narrow. Thus, in addition to the traditional understanding of

colonialism as a practice of one nation dominating another, Guillermo Perry rightly believes that colonialism is associated with the *physical conquest* of a nation by penetrating its territory, and neocolonialism (imperialism) means *taking control* of another State through politics and ideals (Perry, 2015). The research on new mechanisms and forms of neocolonialist "partnership" has been going on for more than half a century (Shchetinin, 1972). Scientific literature of the Soviet period already considered functional areas of neocolonialism such as technology aid and food aid, along with the activity of international organizations; all those areas were gradually depriving the postcolonial powers of their political sovereignty (Bokeriya et al., 2022).

Modern studies note that neocolonialism as a model of unequal economic relations between different countries is linked to the process of globalization and prevents many States from adapting to the requirements of the Fourth Industrial Revolution and modern technological challenges (Morozenskaya, 2019). A crucial role in political control over satellite countries belongs to *transnational corporations* (TNCs), which penetrate the markets of developing countries, seize their most profitable economic sectors, and participate in working out and implementing strategic policy decisions (Sirotkina, 2020). Unlike the policy of traditional colonialism, which relies on the representatives appointed by the dominant country to govern the colony, neocolonialism relies on the *ruling elite from among the indigenous population* of the dependent country, who have received educational and ideological training in the hegemon country (Dubrovin, 2019). Moreover, a new field of research has recently emerged, the technopolitics of specialization, it focuses on establishing unequal positions based on the hegemon country's control over techno-epistemic networks responsible for the supply of reliable information; such a monopoly glosses over the persistence of neocolonialism especially in the Global South (Imbong, 2023).

The same goal is pursued by methods that help to maintain financial neocolonialism, when through multinational corporations and monetary unions, European countries take control of the financial development of many African countries, preventing them from achieving financial sovereignty. These monetary associations primarily include the West African Economic and Monetary Union and the Economic Community of Central African States. Since the development of financial technologies can help countries to end their colonial dependence, European States are pursuing a counterattacking strategy aimed at limiting the use of financial technologies and cryptocurrency markets (Ratnikov, 2024).

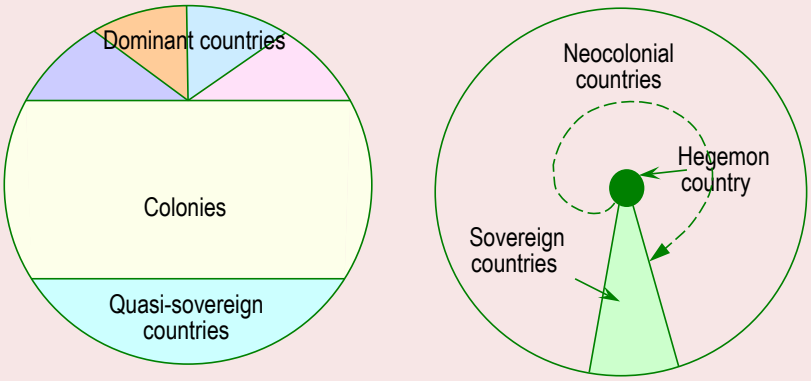
Researchers also note the existence of ideological veil regarding neocolonialism, when the failures of postcolonial countries and civil wars in Africa are explained by purely internal factors like conflicts between local communities, pathology of regional elites, the national "greed and discontentment" syndrome, anarchic attitudes and the "new barbarism" of indigenous peoples. Contrary to such opinions, the literature examines in detail the role of American neocolonialism in aggravating the problems of Third World countries and, in particular, in unleashing the first civil war in Liberia (Kieh, 2012). A number of studies considering the exploitation of Chinese workers in the British Transvaal Colony at the beginning of the 20th century trace the historical origins of modern Western neocolonialism, based on double standards and postulating the initial inequality of the contracting parties (Fituni, 2023).

What has been mentioned above is quite enough for understanding the specifics of modern neocolonialism. A schematic explanation of the two stages in the development of the world economic system is presented in *Figure 1*, which shows the plurality of dominant countries in the colonial period (left diagram) and the geopolitical cycle in the phase of neocolonialism (right structural model). Indeed, at an early stage, Portugal, Spain,

the Netherlands, Great Britain, Belgium and other countries were colonial powers; the vast majority of the rest of the world was a zone of their colonial possessions. At the same time, there were countries that could be called *quasi-sovereign*. These include China, which was never formally a colony, but for 200 years was largely under the limited protectorate of Britain; Japan also avoided falling into the category of a colony by delicately balancing on the edge between concessions to European traders and maintaining its statehood against the backdrop of active economic modernization. The Russian Empire fought for its independence with varying success, while simultaneously remaining in a state of permanent war with Western countries and in the cultural orbit of Europe. In this regard, the world economic system itself looked like a puff pastry pie (left diagram of Fig. 1): dominant countries were on its top; they were fed by colonies' resources from below; and on the outskirts of the system there were satellite countries, seemingly independent but strongly involved in the general logic of dominant countries' development.

Since the 1960s the colonial model has been replaced by the neocolonial one, and a single and extremely strong world leader, the United States, has crystallized, taking the position of the core of the geopolitical system. According to G. Arrighi's theory, each historical center of world capital has mastered a new (additional) managerial function (power) (Arrighi, 2009). In the 20th century the United States, having become a global power, mastered three essential skills – the ability to *protect* its interests anywhere in the world, *produce* a huge mass of goods within the country and *integrate* (i.e. internalize) all world markets into the orbit of its interests (Arrighi, 2009, p. 39). The fourth skill – to *reproduce* their own capital accumulation regime within the established geographical jurisdiction – turned out to be beyond their capabilities. However, the previous three functions were enough for the United States to build a neocolonial system, where only one country acted as the core of the world system, dragging all other countries into the orbit of its interests (this circumstance is shown by the dotted spiral in the right diagram of Fig. 1). World War II weakened all European countries, which lost their status as sovereign hegemon countries and gradually became dependent on one of the giants – the USA or the USSR. In parallel, since the 1960s, countries that acquired unprecedented political sovereignty were finally localized. This is the USSR, which claimed to be a world leader, and the countries that were part of the alternative

Figure 1. Comparison of two models of the geopolitical system



Source: own compilation.

colonial empire it created – the world system of socialism, i.e. the zone of its influence[1]. This block of countries opposed the United States, preventing it from carrying out steady spiral movement of capital accumulation (this fact is shown in the right-hand diagram of Fig. 1 in the form of a dark segment of countries that have become an obstacle to the natural movement of capital). In such circumstances, the U.S. logically faced the task of moving to more sophisticated methods of maintaining its hegemony aimed at clearing the geopolitical space and eliminating an alien segment of sovereign countries; these methods became an organizational framework of neocolonialism. The main features of the two dominance regimes are shown in *Table 1.*

The period of neocolonialism is characterized by gradual mutual recombination of segments of neocolonial and sovereign States. So, in 1952 and 1960 Britain and France joined the nuclear club, signifying their political sovereignty; in 1964 and 1974 China and India joined this pool of countries, respectively, and in 1979 Israel joined it unofficially[2]. Thus, the United States was forced to take these countries into consideration, but in the post-war years there was a pendulum movement along the line of strengthening/weakening U.S. hegemony.

Thus, after the First World War, the United States "took over" the UK's position as a global exporter of capital and producer of goods (including food and weapons), and during the Second World War, as part of the destroyers-for-bases deal, they turned the network of British military bases into their own system of strategic dominance[3]. Since then, the UK, having lost its overseas possessions, started turning back into a relatively small island country with a culture close to the American one, which slowly but surely led it to voluntarily join the U.S. foreign policy. France, being surrounded by puppet European powers, also gradually slipped into the zone of influence of the United States. We agree with M. Houellebecq, who wrote that "even such authoritarian and determined leaders as General de Gaulle proved powerless to resist the vector of history; the whole of Europe turned into a remote, aging, depressive and slightly awkward province

Table 1. Comparative characteristics of the two dominance systems

Characteristic	Dominance type	
	Colonialism	Neocolonialism
Period of existence	1500s–1960s	1960 – present
Object of interest	Territory + resources	Resources + population
Type of control	Open, official (de-jure)	Hidden, unofficial (de-facto)
Way to influence society	Military (physical) pressure	Organizational, financial and ideological control
Origin of the power elites	Delegated from the dominant country	Nourished among the local population
Vector of pressure on the masses	Forceful suppression (hard power)	Ideological rewiring (soft power)
Channels of influence	Direct management + TNCs	TNCs + indirect management (food, technology, international)
Number of world centers of influence	Several	One
Scale of influence of world centers	Considerable	Overwhelming
Source: own compilation.		

[1] Strictly speaking, the USSR's zone of influence was not entirely a colonial system, due to the fact that the dominant country did not set out to squeeze out all the resources of the colonies, but on the contrary, provided them with fairly substantial assistance free of charge. Nevertheless, the effect of the zone of influence took place and looked similar to the colonial system.

[2] Israel has not yet conducted nuclear tests, and therefore its official status as a nuclear power remains unconfirmed.

[3] *Amerika protiv vsekh. Geopolitika, gosudarstvennost' i global'naya rol' SShA: istoriya i sovremennost'* [America Against Everyone. Geopolitics, Statehood, and the Global Role of the United States: History and Modernity]. Moscow: Sodruzhestvo kultur, 2023.

of the United States of America" (Houellebecq, 2023, pp. 521–522). A detailed anatomy of how the French were reformatted into Americans is given by Régis Debray in his book (Debray, 2019). He claims that the process is connected with an ongoing objective civilizational reconstruction[4]. In contrast to this process, the nuclear club expanded, admitting Pakistan and North Korea in 1998 and 2006, respectively. Thus, global influence of the United States in the era of neocolonialism increased against the background of an opposite trend toward expanding the bloc of sovereign countries.

In the 1990s, as Z. Brzeziński rightly noted, the "third world" disappeared due to the disappearance of the "second world" (Brzeziński, 2007, p. 33): the United States and its satellites (the first world), the USSR and its satellites (the second world), and the non-aligned countries (the third world) no longer represented a meaningful geopolitical construct after 1991, because now it was possible to join only one center of power – the United States; such non-alignment meant that a country was politically on its own. All this once again proves the qualitative incompatibility of the two historical stages – traditional colonialism and modern neocolonialism, and indicated a fundamental reformatting of the global geopolitical space in the 20th century. By the beginning of the 21st century, the role of the hegemon country had grown to an astounding absolute.

Neocolonialism and imperialism: Related issues

Discussing the genesis of neocolonialism requires clarifying some related and intertwining concepts and phenomena.

First of all, there is no doubt that elements of neocolonial domination emerged back in the colonial period, i.e. the regimes of colonialism and neocolonialism existed simultaneously during the 1850s–1960s. It was due to the phenomenon of imperialism, which had already emerged by that time and aimed to make capitalism a dominating force throughout the planet (Lenin, 2019). For example, European countries used debt to financially subjugate the Ottoman Empire in the second half of the 19th century, taking into account its formal (imperial) sovereignty (Anderson, 1964). Already during this period, pressure was exerted on peripheral countries not only to seize their natural resources, but also to control their markets. In this regard, we can say that there has always been a mixed system of world governance combining colonial and neocolonial dictatorship methods. The role of neocolonial instruments in the colonial period was supportive, while in the neocolonial period it became crucial. In fact, the difference between the two regimes lies in changing the relative importance of each of them, but this does not negate the fundamental difference in the stages according to which the developed countries established their dominance.

The next point is related to the fact that the lexicon of international political economy contains two notions: "neocolonial countries" and "dominated countries". In particular, the term "dominated countries" was introduced and considered in detail by Alexander Gerschenkron (Gerschenkron, 2015): it suggests a delay in some countries' access to "economic modernity" due to the late introduction of technological advances and due to interference from the countries that entered this modernity first (Landes, 1969). At the end of the 19th century Japan and Russia were dominated countries; while being independent States, they were fighting for access to economic modernity. In this regard, it is necessary to distinguish between the two notions under consideration. In our opinion, neocolonial countries are those that de facto do not have political sovereignty, and therefore cannot actively participate in the struggle for modern technologies and institutions; dominated countries include those that have already gained political

[4] See: How we all became American. Available at: https://inosmi.ru/20170817/240059228.html

sovereignty, but have not yet been able to gain wide access to modern technologies and institutions due to unfavorable historical circumstances. As noted above, at the end of the 19th century Japan and Russia were among the dominated countries, India and China joined this pool in the 20th century, and North Korea and Iran in the 21st century. As a rule, dominated countries carry out a full-fledged mobilization to achieve modernization. For example, India, having lost its colonial status, turned into a dominated country that built its own system of economic planning (Bhagwati, Desai, 1970) against the background of the unification of various intra-Indian nationalist movements (Dube, 1988). Interestingly, transformations of the dominated countries into neocolonial ones are also possible. This happened to Russia after the collapse of the USSR in 1991, when the country became directly, though not completely, dependent on the United States, becoming essentially a neocolonial State and unable to fully implement its development. Something similar happened in the 21st century to European countries, which, being technologically advanced modern States, finally lost their political sovereignty and found themselves completely in the orbit of U.S. influence without the right to express their own will on fundamental issues of foreign policy.

In view of the above, we can argue that the status of a dominated country is a transitional case – from a neocolonial and undeveloped State to a sovereign and developed one. In this interpretation, a dominated country is a sovereign country, but it is undeveloped and has not reached the modern level of modernization (for example, North Korea); or, exactly the opposite, it is developed, but does not have full-fledged sovereignty (for example, South Korea). For our analysis, the dominated countries can be classified as neocolonial in the sense that they are all dependent States that have to overcome either their lack of self-confidence or their underdevelopment.

Another aspect to be clarified is how the above scheme of neocolonialism relates to the existing concepts within the framework of the so-called "dependency theory". In this case, the neocolonial model in Figure 1 is a development of Wallerstein's "center – periphery" model (Wallerstein, 2006), in which the center shrank to a single country, and the periphery and semi-periphery merged into a group of dependent and independent States. The paper (Balatsky, 2024) puts forward a political model of sovereignty, which, along with Wallerstein's technological model, produces a model presented in Figure 1. We assume that such a system naturally fulfills the Prebisch – Singer hypothesis, according to which the price of primary commodities relative to the price of manufactured goods declines in the long term, which causes the terms of trade of primary-product-based neocolonial countries to deteriorate. Currently, statistical tests generally confirm this idea (Arezki et al., 2014). We can assume that our model continues and elaborates on the ideas of dependency theory. In any case, they cannot be contrasted in any way. Nevertheless, we should note that dependency theory, by default, proceeds from the sovereignty of each country, including those in the periphery and semi-periphery. We emphasize that all these countries, as a rule, are not independent players in the geopolitical system, but in many ways follow the policy imposed on them from the outside.

Finally, here is an important point concerning the dialectics of the processes of formation and destruction of colonial systems. They are closely related to the actions of national elites, who themselves are extremely heterogeneous and may adhere to completely different views on the development of their country. The struggle between intra-elite groups, as well as consolidated elites with external pressure, cannot be linear and simple. This is where complex processes arise, emerging trends are being reversed, etc. All the schemes we discuss are stylized and simplified, whereas in reality all the

processes are very confusing and their general logic is sometimes difficult to recognize. Nevertheless, if we discard all the specific layers, then what is left will represent the very schemes we are discussing here; this justifies some simplifications we have to make.

Colonial cycles as a new phenomenon of the 20th century

The advent of the era of neocolonialism coincided with the emergence of a new phenomenon – *colonial cycles*, which we define as power castling, *a process when power shifts from dominant countries to their colonies, regardless of dominance status (de jure or de facto)*. We emphasize that this is not a simple alternation of dominant countries, which took place already during the period of traditional colonialism, but rather the transformation of the governing subsystem (dominant country) into a controlled one (colony), and vice versa, the controlled subsystem (colony) into a governing one (dominant country). Let us consider this process in more detail.

The United States has long been Great Britain's colony and was created by the joint efforts of migrants from Europe. After gaining independence and expanding its borders, the United States began an independent and very dynamic development, gradually outstripping former mother countries of the time, in terms of population, production volume and technology level. The First and Second world wars played a fatal role in the history of Europe, as relatively small European countries lost their influence; and the giants – the USA and the USSR – stepped onto the world stage. Europe itself was divided between these giants, and the sovereignty of even the leading European powers was shaken. During the Cold War only two European members of the nuclear club, the UK and France, maintained their political independence. However, as mentioned above, by the end of the Cold War they lost independence in many aspects, too. In 1990, when the defeat of the USSR in the global confrontation became obvious, the United States emerged as the dominant political architect of Europe, lobbying for the unification of West and East Germany. Zb. Brzeziński noted that at the last stage of the Cold War there were disagreements about the reunification of Germany: for historical reasons neither the UK represented by Margaret Thatcher, nor France represented by François Mitterrand shared the determination of George H.W. Bush and Helmut Kohl to put an end to the division of the country (Brzeziński, 2007, p. 28). Bush not only convinced his British and French allies that a new Germany would not pose a threat to their interests, but also undertook to ensure this (Brzeziński, 2007, p. 61).

Later, a united Germany joined NATO; and after the collapse of the USSR the United States faced an even more ambitious task – to unite Western and Eastern Europe. But it cannot be done when the two groups of countries belong to different military blocs, one of which has ceased to exist. A logical step was to unite the whole Europe under the auspices of NATO on the military grounds; this created the foundations for its economic integration, removal of visa barriers, weakening of border control, etc. Thus, the United States, almost five centuries after its foundation by European immigrants, acted as the architect of the European Union in the form of its malleable and culturally homogeneous strategic partner. From that moment on, the whole of Europe, including France and the United Kingdom, became a neocolonial zone for the United States, with all the ensuing consequences. This is how the *global American-European castling* took place: the United States remained a colony of Britain until 1776; then the two countries coexisted politically for more than two centuries, which ended after 1990 when Britain finally turned into a neocolonial satellite of the United States; the colony and the dominant country switched places.

Today, Europe's subordinate position in relation to the United States is especially obvious. One of the tools to ensure the *homogeneity of European policy* is a supranational body, the European

Commission, whose current head Ursula von der Leyen oversteps her authority on a regular basis by excluding national governments of EU countries from decision-making and being guided by the opinion of a small group of advisers[5].

Even more complex processes engulfed the Soviet Union, which, being the most powerful neocolonial State after 1945, lost not only influence beyond its borders, but also part of its own lands after the collapse. Moreover, at the early stage of building socialism, China entered the orbit of Soviet politics, but since the late 1950s it has aimed at joining the alternative pole of power – the United States. Thus, China turned from a neocolonial zone of the USSR into a neocolonial offshoot of the United States. Then, after more than 60 years, China enhanced its political sovereignty and turned into a dominant country exerting influence in many parts of the world. As for the USSR, after 1991, its successor, the Russian Federation, turned into a neocolonial power with a puppet government, without its own ideology and development strategy. This is one of the dramatic features of Russia's history: when India, China, Iran and other countries with a difficult colonial past gained the long-awaited political sovereignty, Russia lost it.

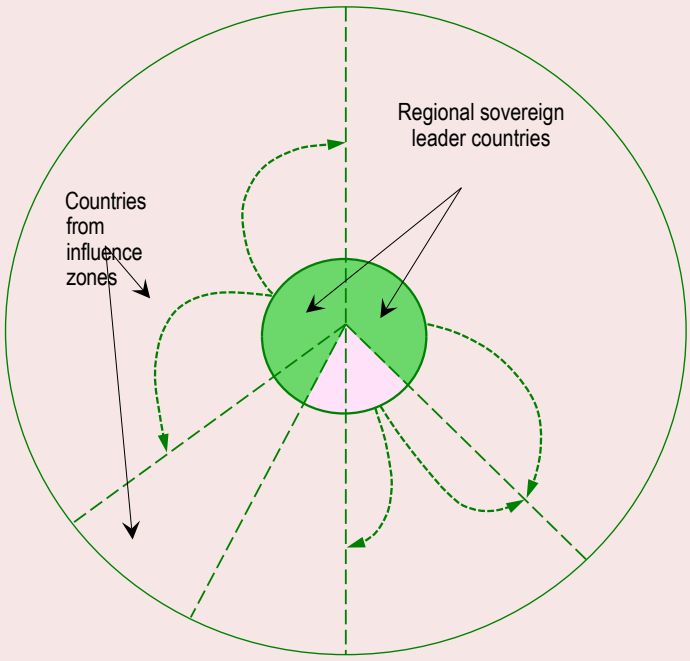
Thus, the era of neocolonialism is highly dynamic: the geopolitical positions of countries are changing dramatically over several decades, whereas during the period of traditional colonialism a country could remain in a subordinate position for centuries. In addition, the scale of the current geopolitical castling moves is truly enormous. For example, not only individual European dominant countries (the city-states of Genoa and Venice, the Netherlands, and the United Kingdom) have lost their positions as power centers, but the entire European continent as well, which is gradually turning from the regional core of the geopolitical system into its semi-periphery.

The main conclusion is that the neocolonial system possesses tremendous dynamism; therefore, any country has a chance to reverse its initially unsuccessful political situation. However, it is quite difficult to derive a winning formula for gaining sovereignty. In fact, a transcendental formula Evolution/Fate/Fortune (EFF) comes into play here; it is based on the *single chance principle*: if a favorable situation was not taken advantage of, then there will be no such opportunity in the future; its alternative formulation is as follows: if it did not work out once, it will never work out again (Balatsky, 2024). The single chance principle includes the factors of Evolution, Fate and Fortune. This means that in reality too many unique circumstances must coincide so that a colony could break free from its hegemon. India and Pakistan are good examples of how difficult and painful it is to get away from the patronage of the dominant country. Suffice it to recall that these countries, having freed themselves from the dictates of one hegemon (Great Britain), were immediately drawn into the orbit of another (USA). Nevertheless, global castling moves between colonies and dominant countries occur with amazing regularity.

Currently, civilizational dynamics witness a clash of opposing trends – toward globalization and toward sovereignization. The 2008–2009 global financial and economic crisis provoked a downward trend in globalization, aggravated by the COVID pandemic and sanctions restrictions against Russia (Kirdina-Chandler, 2022). Apparently, the events of 2022, when the United States launched a proxy war with Russia on the territory of Ukraine, triggered the upward trend of sovereignization and the gradual destruction of the modern system of neocolonialism. The resulting confrontation initiated the creation of geopolitical alliances of countries, and delimited the zones of influence of such regional centers of power as the United States, China, Russia, Iran, etc. These processes have disrupted the original neocolonial model (right-hand diagram of Fig. 1) and launched the formation of a multipolar world

[5] See: "Like a queen". A scandal broke out in Europe over von der Leyen. Available at: https://news.mail.ru/politics/58246250/?frommail=1

Figure 2. The model of a multipolar world



Source: own compilation.

model *(Fig. 2)*. The center of this model is no longer represented by a single hegemon, but rather by several powerful sovereign States (the dark core in the center in Fig. 2), each of which has its own zone of influence represented by many countries in different regions of the world (the countries shown in Fig. 2 between the bordering radii of the regional leader State). The struggle between regional centers of power goes on not so much directly among themselves as by expanding their boundaries of influence and reducing the boundaries of influence of their competitors (this process is shown by dotted lines with arrows in Fig. 2). This model of political competition creates an organizational springboard for subsequent neocolonial cycles.

Today, discussions have already begun about what the model of the new world order will be – unipolar, multipolar or bipolar (Kirdina-Chandler, 2022). It is already obvious that a certain bipolar model will prevail with a movement toward the formation of additional centers of power. In this sense, the model in Figure 2 can be interpreted as a natural generalization of a possible geopolitical configuration.

We should note that the colonial cycles have both global and local dimensions. So, in addition to the castling between the leading centers of power discussed above, there occur less significant, background rearrangements in the priorities of nations and peoples of the world. An example can be found in Portugal's relations with its former colonies, Brazil and Angola.

Thus, back in the 19th century there emerged certain discrepancies between the Portuguese language and the Brazilian Portuguese dialect. In 2008 the Portuguese Parliament voted to amend the spelling to bring the language closer to the Brazilian norm. The agreement on language reform, approved by parliamentarians, standardized the rules of writing and added three letters to the alphabet: k, w, y. In Portuguese spelling, mute consonants should disappear: for example, the word "optimo" should be written the same way as it is pronounced – "otimo". The majority of deputies supported the

draft submitted by the government, according to which the changes will be introduced gradually over the next six years. Supporters of the reform believe that it will make Portuguese more universal, and it would be easier to browse on the Internet. In addition, the unification of the rules will help to avoid potential discrepancies in the interpretation of certain legal documents. However, opponents of the reform argue it is a capitulation to Brazilian influence; 33 thousand people signed a petition against the move. It is noteworthy that the rules adopted by the Portuguese Parliament were agreed upon back in 1991 with seven countries (Brazil, Angola, Mozambique, Guinea-Bissau, Cape Verde, São Tomé and Príncipe, Timor-Leste), whose official language is Portuguese[6]. Thus, the former colonies are successfully pushing even their linguistic norms and initiatives in their former mother country, which once again shows the scale of the cultural flip-flop effect.

In addition to the above example we can point out a shift of economic activity from Portugal to Angola at the beginning of the 21st century. Thus, in 2003 a large number of those who for various reasons had left the country during the civil war began returning to Angola[7]. At the same time, indigenous Portuguese joined this process, hoping to find a more suitable job in Angola or even launch their own business. Many Portuguese saw the former colony as a more interesting place to live and work. Here we are already faced with an economic flip-flop effect.

The rise and fall of different countries is typical for the history of human civilization. In this sense, colonial cycles are a natural manifestation of this general principle. While shifting the balance of power between hegemon and colony is an extremely interesting and important phenomenon in geopolitical dynamics.

[6] See: https://www.rbc.ru/society/17/05/2008/5703cc8d9a79470eaf76aa64; https://fishki.net/2781045-prowaja-portugalyskij-zdravstvuj-brazilyskij-interesnye-fakty-o-jazykah.html

[7] See: https://ria.ru/20030222/327739.html

Determinants of colonial cycles

The existence of colonial cycles has been shown above; and this urges us to think why they occur and what forces drive geopolitical processes. Without going into unnecessary details, we note the objective and subjective determinants of the colonial cycles. Let us look at them in more detail.

1. Scale effect. Recent studies of the history of humankind over 70 thousand years demonstrate that the main driver of civilizational dynamics was the so-called *scale effect*, according to which an increase in production (scale of activity) leads to an increase in its efficiency (Sachs, 2022). The existence of scale effect naturally led to constant competition for it – different countries fought for their own growth and external expansion, because this made them even stronger and more effective (Balatsky, 2024). However, scale effect is a "living thing", i.e. it tends to be gradually exhausted, when further geographical and industrial expansion no longer leads to increased efficiency, but on the contrary, generates failures in it.

Formally, the scale effect in relation to external expansion is as follows:

$$dP/dC > 0, \quad (1)$$

where P – labor productivity of the leader country (or per capita GDP);

C – cost of the country's external expansion.

According to logic (1), an increase in the cost of maintaining global dominance should lead to an increase in the efficiency of national production and the welfare of the nation.

In relation to the United States, the workings of this effect can be illustrated in the following stylized, but quite adequate way. After 1945 the country began its rapid external expansion, which involved seizing economic markets in various parts of the world while backing this process up with military means by creating military bases where necessary. Military control over the "conquered" countries guaranteed the absence of sudden and unfriendly

economic decisions that could be made by their governments for American businesses to deal with; this increased the profitability of national production and trade. The United States has come a long way in this direction, having established about 750 military bases around the world (Sachs, 2022). During this campaign, the rest of the countries were developing and many of them were also actively exploiting the scale effect; as a result, the United States found itself in a situation where further increasing the cost of expanding the network of military bases no longer increased the economic efficiency of national businesses and, consequently, did not pay off. Thus, there emerges a simple dilemma: either abandon further external expansion and focus on consolidating the already established power structure, or continue expansion with a decrease in the effectiveness of the national economic model with the risk of unexpected market failures and all the ensuing consequences. At this point there emerged a trend when the most powerful countries started gaining sovereignty; they subsequently become alternative centers of power and embarked on a journey toward external expansion and exploitation of the scale effect.

2. Balance of power effect. It is another strong objective factor in undermining the monocentric model of the world and the emergence of international castling in the geopolitical space. One can agree with K. Waltz regarding the role of this principle: "If there is any distinctively political theory of international politics, balance-of-power theory is it. And yet one cannot find a statement of the theory that is generally accepted" (Waltz, 1979, p. 117). Some attempts to verify the power indicator miss the rule of the initial principle itself (Balance of Power..., 2021), and it is quite difficult to check whether the options for setting the rules comply with reality (Degterev, Khudaikulova, 2018). Although there are many formulations and interpretations of the balance of power principle today, its consensus form has not been determined (Zobnin, 2014). Recently, interesting attempts have been made to compare the balance of power effect with various social, economic, and military cycles (Fenenko, 2022).

With that said, let us give our interpretation of the balance of power effect, embedded in a more general scheme of the world order. To do this, we will use the following structural balance:

$$\underbrace{\left(\begin{matrix}\text{World}\\ \text{order}\end{matrix}\right)}_{\text{Equilibrium}} = \underbrace{\left(\begin{matrix}\text{Dominance}\\ \text{of the center}\end{matrix}\right)}_{\text{Monocentricity}} - \underbrace{\left(\begin{matrix}\text{Balance of power}\\ \text{effect}\end{matrix}\right)}_{\text{Multipolarity}}. \quad (2)$$

The balance of power rule (BOP) (2) suggests that the excessive pressure of the hegemon country on the participants of the world economic system causes them to respond by forming various alliances capable of weakening the power of the center. Of course, the BOP is not so much a quantitative as a qualitative construction for understanding the general course of events. According to it, consensus on the established world order allows the system to be in a state of equilibrium or close to it (quantifiably, this can be expressed by a value close to zero). However, various events such as the strengthening of some countries can cause excessive pressure on them from the hegemon country and thus generate some *positive tension* in the system in the form of dissatisfaction with the restrictive policies of the center. If this discontent covers several countries, it provokes their unification and opposition to the established rules, thereby generating *negative tension* in the form of actions to destroy the previous order. The long-term persistence of significant positive tension in the global economic system is fraught with global stagnation, and excessive activity of the balance of power effect can lead to military clashes of various intensity.

Under a monocentric regime, when the power of the leader country is generally recognized and it performs a relatively successful regulatory function, the balance of power effect does not manifest itself; if new centers of power are growing in the system,

then the pressure of the hegemon country provokes a policy of containment against them; and on their part, the balance effect is spreading through the system and triggers a multipolarity regime. In reality, the modern world is rather hybrid, combining the features of uni- and multipolarity (Nye, 2023, p. 70). In this sense, we can say that in some historical periods the world tends toward a monocentric regime, while in others it tends toward multipolarity.

Since the world does not remain in the same condition, forces are constantly emerging in it that call into question the legitimacy of the established world order. For example, the "spillover" of the scale effect from a hegemon country to other countries changes the geopolitical disposition and automatically activates the BOP in formula (2). The joint and partially coordinated actions of countries dissatisfied with the old order provoke its destruction and the establishment of a new one. And it is within the framework of this process that the neocolonial castling of countries takes place, when some gain independence and others lose it.

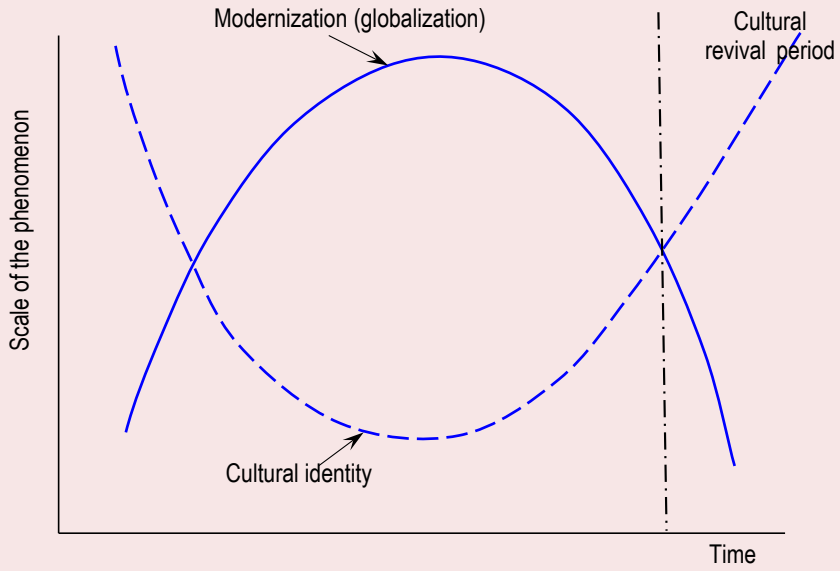
We cannot ignore the fact that the BOP is often subjected to critical attacks from influential experts. One of these is J. Nye, who considered the BOP to be too mechanical (Nye, 2023, p. 36). However, his specific examples are inconclusive, if not erroneous. First, he believes that countries often join not the weak side, but the strong side, as happened with Mussolini's Italy joining Hitler's Germany in World War II (Nye, 2023, p. 37). However, this even already occurred during a period of multipolarity and geopolitical turbulence, when Britain's hegemony was denied by both of these countries and their leaders. Second, in his opinion, the geographical proximity of some kind of danger is of great importance: an example is Europe and Japan joining the United States after 1945, rather than uniting against it, although the U.S. was the most powerful country in the world. However, this is a clear distortion of the facts – neither Western Europe nor Japan made their own decisions after the nuclear bombing; history made this choice for them under direct pressure from the United States. Therefore, we can agree with Nye that the BOP is not a mechanically accurate model of international relations, but we do not have sufficient grounds to reject it completely.

3. Globalization saturation effect. Another factor of colonial castling is what can be called the *globalization saturation effect*. The fact is that, as J. Nye rightly pointed out, it is necessary to take into account a complex interplay of globalization and national culture. Thus, a hegemon country that generates globalization of its culture and thus causes modernization of society in any other country in the world has its own limit of influence: sooner or later modernization ends and the cultural identity of the country is what ultimately remains (Nye, 2023, p. 148). Continuing Nye's logic, we can imagine the process of globalization in the form of two non-linear trends: globalization of the culture of a hegemon country with concomitant modernization of the society of a recipient state and cultural self-identification of the local people *(Fig. 3)*. At a certain point in time, the first trend (solid line in Fig. 3) weakens, and the second one (dotted line in Fig. 3) strengthens. At this moment, the cultural renaissance of the nation begins, and the previous era of "hamburgerization" ends[8]. This effect plays into the hands of the anti-colonial movement.

4. Political leader effect. It would be wrong to try and eliminate the subjective factor from the process of a country's movement toward sovereignty.

[8] A typical and simplest illustration of the weakening of globalization trends is the double castling in public catering that took place in Russia: after 1991, the American fast food chain McDonald's gained enormous popularity in the country, but it was gradually replaced by shawarma production stands, restaurants that serve Georgian cuisine, and other establishments with a local cultural basis; after the company left Russia in 2022, its place was taken by a new Russian network, "Vkusno – i tochka", without any harm to consumers. Similar processes unfolded after 2022 when such popular foreign chocolate brands as Mars, Snickers and Bounty were replaced and supplemented with a wide range of domestically produced candy bars. These are just illustrations of the general thesis.

Figure 3. "Globalization – culture" cycle



Source: own compilation.

The State should have its own leader of the movement, capable of adding the necessary vector to all transformations. At the same time, we cannot name any a priori properties of such a person. This process is largely unpredictable and transcendental. In this regard, it is appropriate to recall Mohandas Karamchand Gandhi, who became the leader and ideologue of the movement for India's independence from Great Britain. And this despite the fact that the man was a vegetarian all his life and was concerned by what he could eat and what he could not; this was a man who, in adulthood, could not speak publicly and was not even able to read a report he himself had written; the idea of nonviolence he preached did not correspond in any way to the severity of the confrontation with the hegemon country; he was small, fragile, bold and wore glasses; all this also did not contribute to the persuasiveness of his speeches, etc. (Gandhi, 2021). Despite this, his case was ultimately successful. At the same time, it would be a mistake to attribute all the achievements in the liberation of India to its national leader. The results of the Second World War, the role of the USSR in supporting the anti-colonial movement, the involvement of the BOP, and other factors combined to produce the desired result. In fact, this is a typical example of the EFF formula. However, the increased complexity of the specific process of sovereignization does not mean that its general model will not be reproduced over and over again.

The political leader effect is fraught with surprises for a hegemon country, even in a relatively favorable situation for it. An example of this is the last Shah of Iran, Mohammad Reza Pahlavi, who was a U.S. protégé. Despite the Shah's loyalty to American politics, in the 1970s, in the wake of rising oil prices, he began a large-scale modernization of the country, which was not part of the plans of the American establishment. And although the policy undertaken by the Shah turned out to be extremely ill-conceived and ineffective (Kapuschinsky, 2007), the United States perceived the actions of the Iranian leader as extremely undesirable and refused to help him when massive anti-government protests broke out in the country. In this case, it is clear how

an individual ruler, even as a protégé of a hegemon country, can suddenly get out of control and start undesirable actions. Today, Turkish leader Recep Tayyip Erdoğan is carrying out similar geopolitical maneuvers, alternately changing the vector of the country's development from pro-American to anti-American.

The most telling example of the political leader effect is the case of Russian President Vladimir Putin, who came to power in 2000 and was supporting a comprador policy for a long time. His attempts to include Russia in the European Union and then in NATO testified to his complete loyalty to Western attitudes. Nevertheless, after 2014, Vladimir Putin's actions deranged the plans of the American establishment (Ekimova, 2024b); According to former U.S. President George W. Bush, the American administration expected that "Russia would be more compliant. But then Putin changed dramatically"[9]. Of course, such a large-scale turn in national politics is not made by a single person, but the role of the country's supreme leader at such moments is enormous. And such seemingly spontaneous actions are precisely what predetermines a country's exit from the neocolonial trap.

5. Economic patriotism. In some cases, the geopolitical confrontation of countries, including sanctions and protectionism, can cause passionary movements not only in the elites, but also in the population. Today, the concept of *economic patriotism* is already becoming widespread, which implies an outburst of patriotic and quasi-patriotic feelings among the peoples of the countries experiencing pressure from the hegemon country, including in the form of economic sanctions. Such sentiments form an additional potential for inter-ethnic harmony (Karnyshev et al., 2017). A typical example of this kind of process is the growth of domestic tourism in Russia as a response to the closure of many Western countries for Russian citizens. Similar processes can spread to different markets and contribute to the castling of forces in favor of neocolonial States.

Recent studies of the impact of U.S. economic coercion measures such as trade tariffs, financial penalties, export control and international sanctions show that they are transforming global politics and economics toward reducing the influence of American hegemony; States and companies are looking for ways to circumvent restrictions, governments of countries under restrictions are forming alliances; China and Russia form an alternative center of gravity in the world (Demarais, 2024). A typical example of this kind of consolidation of the internal forces of a country under pressure from the United States is, according to the Russia Public Opinion Research Center (VCIOM), an increase in the proportion of Russians who consider themselves patriots of Russia from 80 to 94% in 2016–2024; according to the Public Opinion Foundation (FOM), the proportion of Russians who approve of the way that the Russian President is handling his job increased from 61 to 78% in 2021–2024 (Ekimova, 2024a). Thus, the pressure of the hegemon country leads to increased resistance from the dependent countries.

Expanded model of a country's success in the context of neocolonialism

As already mentioned, in the context of neocolonialism, most States are characterized by a discrepancy between the de jure and de facto statuses. And this fact cannot be ignored, although traditional economic theories and doctrines of the West carefully conceal it. For example, today we should consider an expanded formula for the success of a State:

$$\underbrace{\left(\text{Success of the country}\right)}_{\substack{\text{Total outcome}\\ \text{(synergistic effect)}}} = \underbrace{\left(\text{People's welfare}\right)}_{\substack{\text{Internal situation}\\ \text{(social effect)}}} + \underbrace{\left(\text{Sovereignty of the State}\right)}_{\substack{\text{External situation}\\ \text{(political effect)}}}. \quad (3)$$

[9] See: https://ren.tv/news/v-rossii/977084-vovan-i-leksus-pokazali-prank-s-bushem-na-forume-novye-gorizonty

At first glance, this formula is trivial and self-evident, but this is not entirely true. The fact is that conventional economic concepts use a truncated formula, when the addend in the right-hand side (3) is missing (by definition, the addend is the same for all, and therefore it is ignored), and this logic produces completely different mental and ideological attitudes. To illustrate the analytical manipulation of this formula, let us consider the example of South Korea and North Korea.

If we take a one-factor formula (3), where there is no effect of state sovereignty, then the per capita GDP indicator, which acts as a fully adequate measure of the welfare of the country's population, is much higher for South Korea than for North Korea; in general, the internal situation can be assessed by a vector of different indicators with their subsequent aggregation, which does not change the very logic of formula (3). This leads to the conclusion that South Korea has achieved more significant success in social and economic development. If necessary, this conclusion is sometimes supported by a kind of geopolitical trolling – a snapshot of the night map of the Korean Peninsula obtained from space is published; the photo contrasts the southern part flooded with light and the northern part immersed in darkness (Acemoğlu, Robinson, 2015, p. 101). Such analytical and factual passages are intended to substantiate a simple conclusion: a country with a democratic regime of government (South Korea) is capable of achieving impressive development results, and a country with an authoritarian regime (North Korea) cannot claim a worthy place in modern civilization. Other consequences follow almost automatically: the North Korean government is ruining its population, pursuing an aggressive foreign policy and acting as one of the representatives of the global "axis of evil".

However, if we consider an extended formula for success (3), the situation becomes radically different. Granted, South Korea has a higher standard of living and consumption than North Korea, but it is a puppet regime of the United States, which has deployed its military bases on its territory and uses the country as a bargaining chip in its strategic interests against North Korea. And no amount of protests against the current situation on the part of South Korea can change anything, although the struggle of the South Korean elites for liberation from American dictate is ongoing. Against this background, North Korea has developed its own nuclear technology, created an impressive military-industrial complex, joined the nuclear club, defended its political sovereignty, and inspires outright fear in the neighboring Japan and the United States itself. With this interpretation of events, balance (3) no longer allows us to talk about the total advantage of South Korea; rather, the opposite is true – the advantages are on the side of North Korea.

Earlier, Pakistan became a nuclear power, and now Iran is close to achieving this goal. And all these countries have made great sacrifices on the altar of their sovereignty – North Korea and Iran have been subjected to large-scale international economic sanctions, and the people of Pakistan have already paid in full for the success of their State. To understand the drama of the political choice that these countries had to make, it is enough to recall the words of Pakistani Prime Minister Zulfikar Ali Bhutto: "Pakistan will eat grass or leaves, even suffer from hunger, but will create a nuclear bomb"[10]. It cannot be otherwise – a country's political sovereignty requires social sacrifices, but these sacrifices are not in vain and must be taken into account in the overall balance of national achievements. We agree with S. Karaganov and co-authors who point out that today there is "convergence between economy and security" (Trenin et al., 2024, p. 103); this thesis is the basis for structural equation (3).

[10] See: Guskova A. How Pakistan became a nuclear power. Available at: https://warspot.ru/3251-kak-pakistan-stal-yadernoy-derzhavoy?ysclid=lyzyg89ngs800801171

We should emphasize that such social costs do not proceed from the political recklessness of the ambitious rulers of these countries. The fact is that formula (3) takes into account not only short-term, but also long-term effects. In the short term ignoring the factor of a country's sovereignty can give a positive result, while in the long term it is almost impossible. This pattern is due to the fact that the effectiveness of managing internal processes in a country directly depends on the government's freedom to make appropriate decisions. External interference from the hegemon country, as a rule, eliminates many effective domestic policy options.

It is noteworthy that already during the period of his famous reforms, Chinese leader Deng Xiaoping formulated three conditions for their justification: ensuring the growth of production; improving the standard of living; increasing the total power of the State (Ovchinnikov, 2021, p. 19). It is easy to see that the first two conditions "cover" the first term on the right side of formula (3), and the third condition covers the second term. Thus, already in the second half of the 20th century, the Chinese leadership clearly acted in accordance with expanded model (3).

Thus, structural balance (3) sets a new analytical framework for the study of geopolitical and economic processes. At the same time, the verification of both components of the right-hand side (3) is not very difficult. Even the second component involves calculating a specially designed index of a country's sovereignty, which, for example, can take values from 0 to 1. Paradoxically, the ability of a country to launch an armed conflict with another country is a sign of its sovereignty; otherwise, such decisions are made by the hegemon country.

From an instrumental point of view, structural balance (3) is written in an additive form, although it can also be represented in a multiplicative form (by multiplying the two components of the right-hand side (3)). This does not change the essence of the phenomena under consideration.

Machiavelli's militaristic model: A revised definition

It is interesting that model (3) was considered in a slightly different form in N. Machiavelli's classic work *The Prince*, which contains Chapter X "Concerning the way in which the strength of all principalities ought to be measured". In this chapter the author says: "It is necessary to consider another point in examining the character of these principalities: that is, whether a prince has such power that, in case of need, he can support himself with his own resources, or whether he has always need of the assistance of others" (Machiavelli, 2018, p. 62). Further, in Chapter XII, he actually gives a ready-made formula for the success of a country: "The chief foundations of all states ... are good laws and good arms; and as there cannot be good laws where the state is not well armed, it follows that where they are well armed they have good laws" (Machiavelli, 2018, p. 66):

$$\underbrace{\left(\begin{matrix}\text{Success}\\ \text{of the country}\end{matrix}\right)}_{\text{Total outcome}} = \underbrace{\left(\begin{matrix}\text{Just}\\ \text{laws}\end{matrix}\right)}_{\text{Internal situation}} + \underbrace{\left(\begin{matrix}\text{Strong}\\ \text{army}\end{matrix}\right)}_{\text{External situation}}. \quad (4)$$

It is easy to see the almost complete identity of structural models (3) and (4), which allows us to consider Machiavelli as one of the predecessors of model (3).

Speaking of a good army, Machiavelli means the State's own armed forces, categorically excluding not only the auxiliaries, but also the mercenaries. According to Machiavelli, the auxiliaries are useless, because their defeat threatens the death of those who called them to help, and their victory means dependence on them (Machiavelli, 2018, p. 70). The systems defect of a mercenary army is produced by the following principle: why do you need money if you get killed? In this regard, Machiavelli gives a harsh verdict: "Mercenaries are famous for advancing slowly and sluggishly, but retreating with remarkable speed" (Machiavelli, 2018, p. 69). Developing this idea further, the author believes that in addition to decent pay for the military, the condition

of their vital interest in the outcome of the battle must be met, and this is achieved by the valor and dedication of their fellow citizens who have become warriors (Machiavelli, 2018, p. 73). Based on these considerations, we can write another structural equation in the development of equation (4):

$$\underbrace{\begin{pmatrix}\text{Strong}\\ \text{army}\end{pmatrix}}_{\text{Total outcome}} = \underbrace{\begin{pmatrix}\text{Decent}\\ \text{payment}\end{pmatrix}}_{\text{Material factor}} + \underbrace{\begin{pmatrix}\text{Civic}\\ \text{patriotism}\end{pmatrix}}_{\text{Moral factor}}. \quad (5)$$

Consequently, equation (5), on the one hand, reveals and details equation (4), and on the other hand, it has the same architecture as equations (3) and (4). In fact, there are two multilevel components in the right-hand sides of all three equations – the lowest, represented by the first component, and the highest, represented by the second component. At the same time, paradoxically, higher matters (political sovereignty of the country, its armed forces and the patriotism of the latter) are prerequisites for the effective implementation of the basic foundations of the State (welfare and patriotism of the population).

Equations (4) and (5) are the essence of Machiavelli's militaristic model. Here, as in the case of model (3), equivalent versions of formulas (4) and (5) in multiplicative form are possible.

Little has changed since Machiavelli's time. For example, the United States, as an ally of the USSR in World War II, took control of half of Europe, including half of Germany, all of Japan and half of Korea, and then became the general rival of the Soviet Union in the Third World War (Cold War). Accordingly, Germany and Japan are still formally prohibited from having their own armed forces, and U.S. allies that have U.S. military bases on their territory actually use the allied army of the hegemon country. And in almost all of these countries the situation is developing according to the scenarios described by Machiavelli: either the United States fully controls the strategic aspects of the existence of the allied countries, or in the event of an unfavorable set of circumstances, they abandon their colonies to their fate. At the same time, the external welfare of the allied countries can successfully mask their political independence until the onset of critical events in their history. The political establishment of the dependent countries is gradually becoming aware of these simple truths and is now intensifying the struggle for sovereignty.

Conclusion

Today, the world is facing another neocolonial cycle. It is difficult to say who depends more on whom today – China on the United States or the United States on China. This is a starting point for another colonial castling. At the same time, Russia's role on the Eurasian continent is increasing. Iran is "ready to jump", which could be followed by a powerful surge. India is ahead of China in terms of dynamism. All these events are capable of depriving the United States of hegemony, and in the long run, turning it into a quasi-sovereign country dependent on global resource markets that are under the control of other countries. However, no matter what, the general vector of geopolitical shifts has been determined – a new colonial cycle is being formed. It is possible that European countries will become part of the new colonies, and Russia and China will be above them as hegemon States.

The above picture of tectonic shifts in the geopolitical system does not fit into the cognitive framework of traditional economic and political theories. Under these conditions, the significance of an adequate picture of the world is increasing more than ever before. The most important notion in the concept of colonial cycles proposed above is political sovereignty. Without taking this factor into account, most modern processes in the global economic system do not receive a relevant description and assessment. Conversely, taking this circumstance into consideration can be the first step in building updated social knowledge.

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Professional Standard "Demographer": From the Qualifications of Specialists to Effective Decisions in Demography

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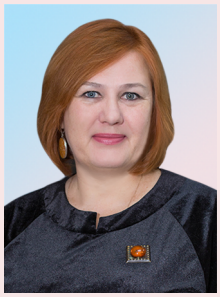

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Abstract. To resolve various strategic and tactical tasks in government and regional agencies, units of municipalities, analytical centers and other non-profit organizations, demographers with considerable expertise are required who can efficiently build and study analytic demographic databases, prepare resources for the development of demographic plans, identify demographic trends, conduct expert examinations of economic and socially significant programs. However, it has been difficult for a long time to assess professional qualifications of specialists in demography in order for them to perform their functions efficiently due to the insufficient number of such specialists and their mixed functionality. Departments and centers of demography opened in leading Russian universities helped resolve this issue. It was the appropriate moment to approve the professional standard "Demographer", which clearly states knowledge, skills and abilities of a demographer at a certain qualification level and functions to perform. However, organizational and methodological issues related to assessing the quality of received training in demography to perform job functions, depending on the position and the organization in which the specialist works or plans to work, require particular attention, which determines the relevance of the studied topic. The aim of the research is to develop organizational and methodological aspects of the process of assessing professional qualifications of specialists in demography for the qualitative performance of their functions and solving issues of society. The article describes the process of assessment of professional qualifications of specialists in demography by the personnel of the Qualification Assessment Center by conducting an examination that allows assessing not only theoretical knowledge, but also skills and abilities of candidates for the qualification; the importance of using a competence approach as a base for assessing qualifications of demographers is substantiated. As part of the organizational and methodological support for the examination to assess professional qualifications of specialists in demography, recommendations are proposed for the document support of the examination, arrangement procedures of the examination, rules of conduct during the examination, requirements for examinees to pass the examination and obtain a certain qualification level as a demographer. It has been revealed that the increasing qualifications of demographic workers provide higher wages and demand for these specialists in the labor market; a demographer's career chart has been constructed, showing the relationship between the qualification level, position, and wages. The methodological basis is represented by the fundamental provisions of the concept of managerial training. The prospects of the study are to improve the quality of training and assessment of professional qualifications of specialists in demography, which will further influence the effectiveness of creation and implementation of projects for the development of human potential in Russia.

Key words: demographer, professional standard, qualification, quality assessment.

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Introduction

Demographic issues such as a fertility decline, a depopulation of small towns, population aging, a decrease in the number of registered marriages, a transition to single-child families, and women postponing the birth of their first child to a later period are currently characteristic of many countries (Gokova, Kiseleva, 2016; Kabaikina, Sushchenko, 2016; Artamonova, Lipchanskaya, 2021).

However, it is in Russia that great importance is attached at the state level to the development of demographic policy to overcome the demographic challenge and resolve these issues.

The "National Security Strategy of the Russian Federation", approved by Decree of the President of the Russian Federation in 2021, shows the importance of the "preservation of the people of Russia and the development of human potential"[1].

From 2019 to 2024, Russia was implementing the national project "Demography", which includes a set of interrelated measures aimed at ensuring sustainable population growth in the country, increasing life expectancy and strengthening health of the nation. Starting in 2025, new national projects "Family", "Long and Active Life", "Youth and Children", etc. will be launched in Russia. Highly qualified specialists in demography are required to effectively achieve the goals and objectives set out in new strategic documents, national projects and regional human development programs.

The importance of resolving demographic issues being emphasized by the state, the timely development of demographic national and federal projects, and the implementation of the National Security Strategy of the Russian Federation indicate that in Russia people are the main resource of the country, and preserving the Russian nation is a chief concern of the state.

In regions of Russia where the demographic issue is particularly acute, authorities are developing regional measures (Korolenko, 2015; Popova, 2016; Rostovskaya, Rychikhina, 2024), such as fertility support (for example, payment of subsidies for families with children, known as maternity capital, by the region), comprehensive assistance to multi-child families (for instance, free of charge kindergarten and a nursery, transport tax concessions, etc.), support for young spouses who become parents while studying at universities and colleges (for example, payment of subsidies for students, known as student capital, at the birth of a child), etc.

The personnel of such regional authorities require qualified demographers with the skills to identify specific demographic drivers of the region, interpret demographic information, design and justify scenarios and forecasts of the demographic development of regions, settlements, small and medium-sized towns, cities, etc.

Demographers who can research into socio-economic and demographic processes in society and provide information about them are also required in analytical centers that are currently widespread in Russia (Analytical Center for the Government of the Russian Federation, Institute of Economic and Social Research, NAFI analytical center, etc.[2]).

Rosstat needs statistician-demographers and demography analysts to create databases using demographic information. Non-profit organizations require demographers who are able to work with the most vulnerable and unprotected population groups. In order to regulate the situation in the labor market, employment centers need specialists who can analyze the impact of demographic processes on the future situation with jobs in the region. The Social Fund of Russia and the Medical Insurance Fund need demographic specialists whose qualifications allow them to carry out demographic analysis and forecasts in order to create programs and plans for the improvement of the healthcare system, social security and pension provision.

[1] On the National Security Strategy of the Russian Federation: Presidential Decree 400, dated July 2, 2021. Available at: https://www.consultant.ru/document/cons_doc_LAW_389271/ (accessed: December 24, 2021).

[2] Kuznetsov A.V. (Ed.). (2021). *Atlas analiticheskikh tsentrov EAES: spravochnik* [Atlas of Analytical Centers of the Eurasian Economic Union: Handbook]. Moscow: INION RAN.

In scientific organizations and communities, scientists are developing a theory of demography and are expanding its methodology, taking into account current trends (Rostovskaya, Rychikhina, 2023). It should be emphasized that today it is the scientific organization, namely the Institute for Demographic Research of FCTAS RAS, that is actively working to create a system of human resources in the field of demography. In 2022, at the initiative of the Institute for Demographic Research of FCTAS RAS and with the support of the professional community, the Ministry of Labor of the Russian Federation approved the professional standard "Demographer"[3]. In 2023, a Coordination Center for the Development of Human Resources was established as part of FCTAS RAS[4]. In 2024, a Concept for the development of human resources in demography was created, which defines "... a fundamentally new approach to the development of human resources in demography: the aim, main tasks, principles, main directions, mechanisms for training, retraining and advanced training of demography specialists"[5]. The implementation of the Concept is based on a multi-level system of interaction between state and public-governmental structures involved in training demography specialists at the federal, regional and local (municipal) levels. The structure of the Coordination Center for the Development of Human Resources in Demography is being strengthened:

– in 2023, the Ural Interregional Center for the Development of Human Resources in Demography was opened, representing a joint project of the Ural Federal University named after the first President of Russia B.N. Yeltsin and the Institute of Economics of the Ural Branch of RAS[6];

– on April 5, 2024, the Regional Center for the Development of Human Resources in Demography was opened on the basis of the Vologda Research Center of RAS and Cherepovets State University[7];

– On September 20, 2024, the Baikal Center for the Development of Human Resources in Demography was opened on the basis of Irkutsk State University and the Irkutsk Scientific Center of the Siberian Branch of RAS[8];

– On December 19–20, 2024, the South Russian Center for the Development of Human Resources in Demography was opened in the Rostov Region in Novocherkassk on the basis of Platov South-Russian State Polytechnic University[9].

Having shown the demand for qualified demographers in organizations and institutions, we will proceed to study the stated issues, namely, the content of basic concepts in the field under consideration, qualification levels of demographers, and difficulties of training as a demographer in

[3] On the approval of the professional standard "Demographer": Order of the Ministry of Labor of the Russian Federation 346n, dated June 8, 2022 Available at: https://mintrud.gov.ru/docs/mintrud/orders/2368?ysclid=l7e9nglzmc73043482

[4] Order on the establishment of a Coordination Center for the Development of Human Resources in Demography. Available at: https://cloud.idrras.ru/wp-content/uploads/2023/06/Приказ-о-создании-ЦК-28.02.2023-2.pdf (accessed: November 20, 2024).

[5] Concept for the development of human resources in demography. Available at: https://cloud.idrras.ru/wp-content/uploads/2024/09/Концепция-5.06.2024.-docx-1.pdf (accessed: November 20, 2024).

[6] Coordination Center for the Development of Human Resources in Demography of the Institute for Demographic Research of FCTAS RAS initiated the creation of the Ural Interregional Center for the Development of Human Resources in Demography. Available at: https://idrras.ru/news/2023/6/razvitie-potenciala-v-oblasti-demografii.html (accessed: November 20, 2024).

[7] Regional Center for the Development of Human Resources in Demography has been established in the Vologda Region. Available at: https://idrras.ru/news/2024/4/reg-centr-razvitiya-kadrov-v-demografii.html (accessed: November 20, 2024).

[8] Baikal Center for the Development of Human Resources in Demography. Available at: https://idrras.ru/news/2024/9/otkrytie-baykalskogo-centra-razvitiya-kadrovogo-potenciala-v-oblasti-demografii.html (accessed: November 20, 2024).

[9] Opening of the South Russian Regional Center for the Development of Human Resources in Demography in Novocherkassk. Available at: https://idrras.ru/news/2024/12/otkrytie-yuzhno-ros-regcentr-razvitiya-kadr-potenciala.html

higher education institutions. Let us elaborate on organizational and methodological aspects of the process of assessing professional qualifications of specialists in demography for the qualitative performance of their functions and resolving the issues of society.

Subject area analysis

The issues of assessing the qualification level of specialists were studied by A.M. Karyakin (Karyakin, Yunikova, 2016), A.O. Minkina (Minkina, 2020), E.V. Pakhomova (Pakhomova, 2013), V.K. Potemkin (Potemkin, 2020), Yu.A. Filyasova (Filyasova, 2021), V.A. Chiker (Chiker, 2017) and other scientists. Currently, when assessing the qualification level of a specialist, a competence approach is of importance, because it allows evaluating knowledge, skills, and performance of employees and determining whether their qualifications correspond to their position (Beisbekova, 2015; Bavykina, Milyaeva, 2016; Radko, 2021). E.E. Symanyuk, L.Yu. Shemyatikhina and M.G. Sinyakova describe the features of using a competence approach in training specialists (Symanyuk et al., 2009). O.L. Chulanova and N.S. Borisenko consider the methodology for implementing this approach during periodic personnel assessment and certification (Chulanova, Borisenko, 2015). As it can be seen, the issue of assessing qualifications of employees using the competence approach is currently very relevant. However, the issues of assessing professional qualifications of demographers using this approach have not been sufficiently researched and require in-depth study.

The variety of functional tasks of demographers (from research and analysis to management) led to the need to create a professional standard "Demographer"[10] and approve levels and sublevels of demographer's qualifications, clearly prescribing the employee's knowledge in the field of demography and required skills for the position.

The demographer's qualification is a degree and type of professional training of an employee, i.e. knowledge, skills and abilities necessary for this person to do a certain work and occupy a certain position (Sizikova, Anikeeva, 2016).

In accordance with the professional standard "Demographer", depending on the knowledge in the field of demography, the skills of the employee and the work done, the sixth and seventh qualification levels of a demographer and six sublevels which define generalized labor functions that a given employee can perform within the framework of his or her professional activity *(Tab. 1*). The higher the qualification level of demographers, the

Table 1. Demographer's qualification levels and sublevels

Qualification level	Description	Description	Qualification sublevel (code)
6	Monitoring of demographic processes in society	Creation of demographic databases by using modern digital technologies	6 (A/01.6)
		Identification of demographic trends at different levels	6 (A/02.6)
7	Forecasting of demographic processes in society	Modeling of demographic processes in society	7 (B/01.7)
		Project the development of demographic processes in society	7 (B/02.7)
	Demographic expert examination and consulting	Demographic expert examination of projects and works	7 (C/01.7)
		Information and analytical support for the implementation of programs and projects for the demographic development of society	7 (C/02.7)

Source: own compilation.

[10] On the approval of the professional standard "Demographer": Order of the Ministry of Labor of the Russian Federation 346n, dated June 8, 2022 Available at: https://mintrud.gov.ru/docs/mintrud/orders/2368?ysclid=l7e9nglzmc73043482

more knowledge, skills and abilities they possess and the more difficult tasks management can set for them. A demographer of the sixth qualification level professionally builds demographic databases and evaluates the demographic situation. If such employees undergo advanced training, they can cope with more complex tasks – project the development of demographic processes in society, and later, after completing training and confirming their qualification level, conduct expert examinations of projects.

Despite the fact that demography as an independent discipline is being introduced into various program tracks, currently at the national level there is no unified education information system that provides access to high-quality education and professional growth as a demographer; the sought-after major "Demography" has not been opened. In this regard, the creation of Federal State Education Standards and higher education programs aimed at training demographers, which is provided by the Education Methodology Council "Demography" as part of the Federal Education Methodology Association "Sociology and Social Work"[11] and the Coordination Center for the Development of Human Resources in Demography of FCTAS RAS, is relevant. This work is supported by representatives of legislative and executive authorities at the federal and regional levels[12].

The Coordination Center for the Development of Human Resources in Demography also contributes to coordinating activities for the formation and improvement of a system of advanced training and professional retraining programs for central and local government employees, managers and specialists of bodies and organizations operating in all areas of socio-demographic development. In a rapidly changing external environment, it is important for demographers to know all current trends in the development of society and to improve their skills in a timely manner.

At the same time, it is also necessary to confirm one's knowledge, skills and abilities at the Qualification Assessment Center (hereinafter referred to as QAC), which comprehensively and professionally conducts an independent assessment of specialists in demography in accordance with requirements of the professional standard "Demographer".

The training of QAC experts in line with the professional standard "Demographer" has been conducted since 2022 by the Council for Professional Qualifications in Occupational Safety, Social Protection and Employment as part of an additional professional advanced training program (program leader – Chairman of the Council Yu.V. Gertsii). It should be emphasized that the authors are the first graduates of this program, which allows them to work as demography experts.

When assessing and assigning a qualification level, QAC experts should be guided by a competence approach based on the knowledge, skills of the employee (applying for the qualification level) and the functions that have to be performed.

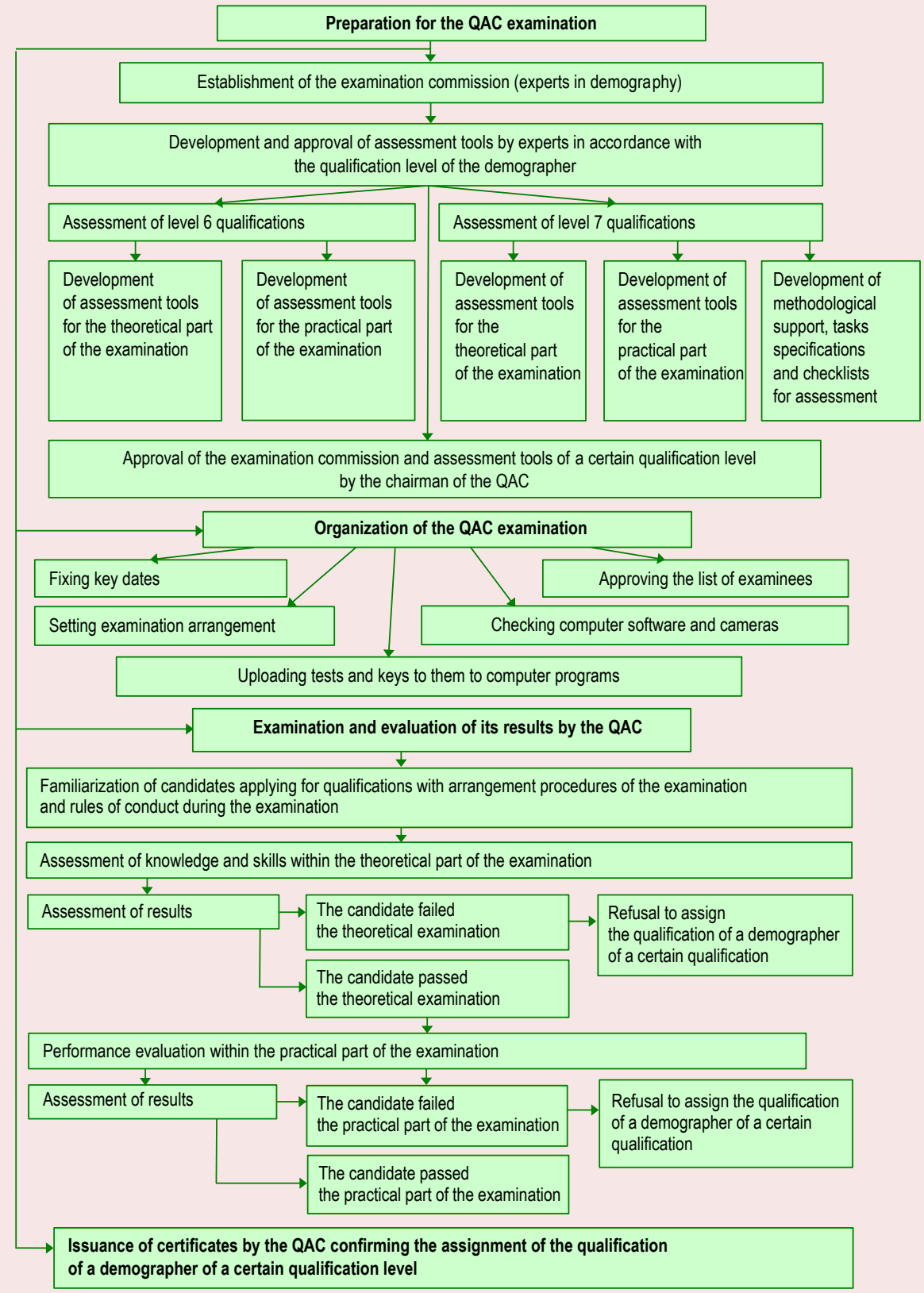
Expert assessment of the quality of professional qualifications of specialists in demography is carried out in four stages *(Fig. 1)*.

1. Preparation for the examination within qualification assessment. It includes establishment of the assessment commission, creation and approval of assessment tools, methodological

[11] Creation of the Education Methodology Council "Demography". Available at: https://idrras.ru/news/2023/6/sozdan-ums-po-demografii.html (accessed: November 20, 2024).

[12] The Ministry of Education and Science supported the proposal of United Russia for systematic training of demographers. Available at: https://er.ru/activity/news/minobrnauki-podderzhalo-predlozhenie-edinoj-rossii-o-sistemnoj-podgotovke-specialistov-demografov (accessed: November 20, 2024); The Russian Ministry of Education and Science supported the training of demographers at universities. Available at: https://idrras.ru/news/2024/7/minobz-podderzhal-podgotovku-demografov.html (accessed: November 20, 2024); T.K. Rostovskaya at the interregional forum on strengthening traditional family, spiritual and moral values. Available at: https://idrras.ru/news/2024/11/semya-osnova-mira.html (accessed: November 20, 2024).

Figure 1. The process of assessing the quality of professional qualifications of specialists in demography



Source: own compilation.

support for the examination (approval of tasks specifications and checklists for assessment). At this stage, demography experts working at the Qualification Assessment Center are creating assessment tools for each demographer's qualification level. In accordance with the decision of the Professional Qualifications Council in the field of Labor Safety, Social Protection and Employment, for testing the knowledge, skills and actions of a demographer it is recommended to create assessment tools of two types: assessment tools for the theoretical part of the examination and assessment tools for the practical part of the examination.

2. Organization of the examination. At this stage, examination dates are fixed, arrangement procedures of the examination and lists of examinees are approved, computer software is checked, and tests and performance evaluation tasks are loaded into the computer program. The assessment of a demography specialist's qualifications includes the examination which takes place in two parts, which allows an objective assessment of the knowledge, skills, abilities and potential of each demographer. In the first part, an assessment of the theoretical knowledge and skills of a specialist in demography is carried out in line with the qualification level. The second part is practical and includes an assessment of performance according to the qualification requirements of the sixth and seventh levels of specialists in demography.

3. Examination and evaluation of the results.

4. Issuance of certificates confirming the qualification of a demographer of a certain qualification level.

Next, we will consider the specifics of each stage organization by the QAC, so that the assessment of professional qualifications of specialists in demography is carried out qualitatively.

Stage 1. In order to conduct the examination, the commission consisting of at least three leading demography experts must be approved in advance (two weeks before the start). Three qualified specialists may not always be available in the region, so it is recommended to invite demography experts from other regions of Russia to administer the examination.

To assess theoretical knowledge of candidates, assessment tools and answers (keys to tasks) should be created for each knowledge and skill in accordance with the professional standard "Demographer". For each job function (knowledge, skills and actions) of a specialist in demography, a test question should be prepared that reveals whether the person's knowledge and skills meet qualification requirements. The test should contain different types of tasks, namely multiple-choice questions, multiple response questions, open questions, and matching. For each task, there should be correct answers (keys). The test should check the competencies given in the professional standard "Demographer".

It is recommended to create 100 similar test questions of various types. It is important to set a point scale by assigning a certain number of points to each correct answer. It can be of any kind and is established by the expert commission. For example, a one-point scale for assessing the answer to a multiple-choice question: correct – 1 point, wrong – 0 points, or a two-point scale that is used for multiple response questions: correct – 2 points, partially correct – 1 point, wrong – 0 points.

Based on the created tasks, the Center's experts should provide methodological support for the examination: tasks specifications and checklists. Tasks specifications for the theoretical part of the professional examination should consider knowledge and skills in line with requirements of the professional standard for qualifications, type and No of the task, description of the task, key to the task, and criteria for assessing the task.

Table 2. Example of tasks specifications for the theoretical part of the professional examination

Knowledge and skills fixed in qualification requirements and examined during the qualification assessment	Task assessment criteria	Type and No of the task	Task	Key to the task
Diagnosis of demographic trends at various levels	*Correct – 1 point, wrong – 0 points*	Multiple-choice question: No 25; No 26	No 25: The population as an object of demographic research is: A) human resources; B) independent members of human society; C) the whole population living in a certain area; D) members of human society of pre-working and working age; No 26: What indicator is a conditional value reflecting the overall population in a period of time? A) at the beginning of the year; B) at the end of the year; C) average; D) over three years	C C
Source: own compilation.				

An example of tasks specifications for the theoretical part of the professional examination is presented in *Table 2*.

Preparation for the practical part of the examination should include creation of a task to assess performance of job functions and actions of a demographic employee in real or simulated conditions. To prepare for this part of the examination at the planning stage, experts should determine a job function (job action), create a task, describe a solution to the task, propose assessment criteria, determine time to complete the task, and make a checklist for the examiner to assess the performance of the practical task.

It is important to develop criteria for assessing the task, which may include:

1) the correct choice of the calculation methodology for the indicator in question;

2) calculation of the indicator;

3) whether or not the result is correct;

4) interpretation of the result.

At the end of the examination, the expert should fill out a checklist to assess performance of the practical task. *Table 3* shows an example of a checklist in the situation when the practical part of the examination is failed (the candidate is not prepared for the qualitative performance of a given function), in *Table 4* – if it is passed (the candidate is prepared for the qualitative performance of a given function).

It is recommended to create a similar practical task for each job function. A practical task is considered completed if all the assessment criteria are met and the time limit is not exceeded.

Stage 2. Organization of the examination:

– the list of examinees should be approved by a special order, as well as the expert examination commission,

– dates are fixed and invitations to the examination are issued,

– examination arrangement procedures are established (120 minutes for the test part (the average time for completing each task is 3 minutes),

– tests are uploaded to the program;

– cameras are installed to monitor the progress of the examination;

– requirements for passing the examination are approved.

Table 4. Checklist for assessing performance of the practical task No 1 (practical part of the examination is passed; the candidate is prepared for the qualitative performance of a given function)

No	Function name	Criterion	Fact Yes/ No	Note
1.				
1.1.	Choice of the methodology for calculating the indicator in question	The right choice of formula	yes	-
1.2.	The very calculation of the indicator	Correct data substitution in the formula	yes	-
1.3.	Getting the result of calculating the indicator in question	The correct calculation result	yes	-
1.4.	Interpretation of the result	A competent conclusion about changes in infant mortality	yes	-
Source: own compilation.				

Table 3. Checklist for assessing performance of the practical task No 1 (practical part of the examination is failed; the candidate is not prepared for the qualitative performance of a given function)

No	Function name	Criterion	Fact Yes/No	Note
1.				
1.1.	Choice of the methodology for calculating the indicator in question	The right choice of formula	yes	-
1.2.	Calculation of the indicator	Correct data substitution in the formula	yes	-
1.3.	Getting the result of calculating the indicator in question	The correct calculation result	no	Calculation error
1.4.	Interpretation of the result	A competent conclusion about changes in infant mortality	no	The result was interpreted incorrectly due to an arithmetic error in calculations
Source: own compilation.				

The requirements for passing the examination include criteria for passing it and obtaining the appropriate qualifications. For example, the minimum threshold for passing the theoretical part is 30 points (the examinee answered 75% of the questions correctly); for passing the practical part – 50 points (the examinee completed 75% of the practical tasks correctly). Based on this, the following requirements for passing the examination can be established:

– the examination is considered passed if the candidate scored, for example, 30 points or more in the theoretical part of the examination, was admitted to the second part and scored at least 50 points in the practical part of the examination;

– the examination is considered failed if the candidate scored, for example, 30 points or more in the theoretical part of the examination, was admitted to the second part – the practical one, and scored less than 50 points in the practical part of the examination);

– the examination is considered failed if the candidate scored, for example, less than 30 points in the theoretical part of the examination and was not allowed to the next part;

– the examination is considered failed if the candidate violated the rules of conduct during the examination (for example, by using the phone during the examination, violating the discipline during the examination).

Stage 3. Examination and evaluation of the results. It is important to familiarize examinees with the rules of conduct during the examination at the Qualification Assessment Center:

1) the examinee must be on time for the examination,

2) the examinee must show a piece of identification (national identity document) before the examination,

3) the examinee cannot talk during the examination,

4) the examinee cannot use the phone during the examination,

5) the examinee must take care of technical equipment.

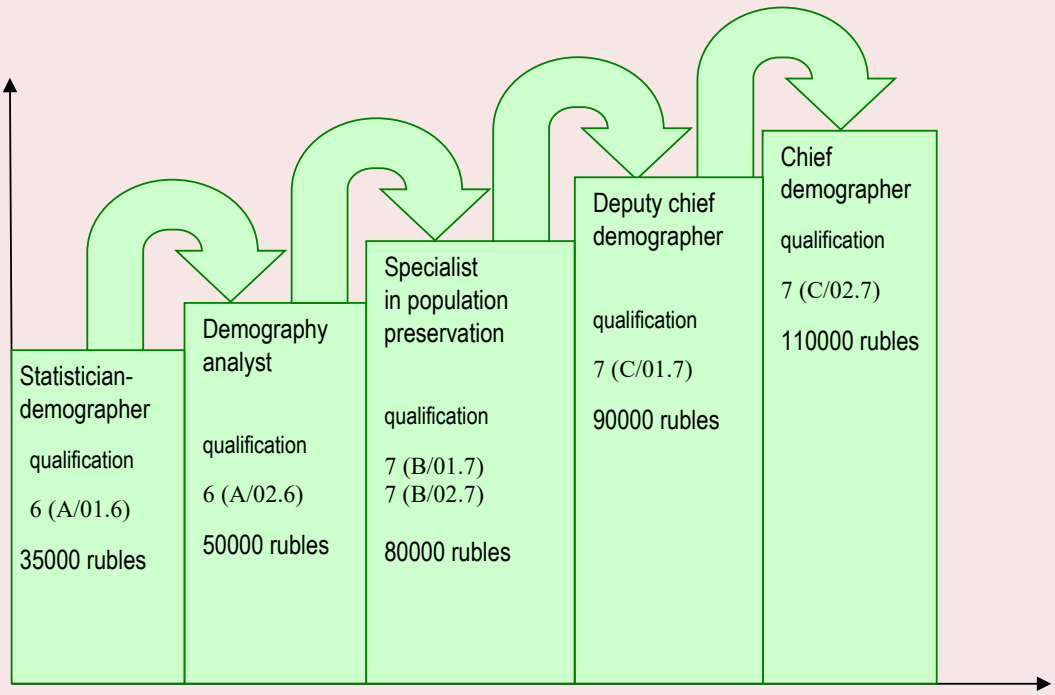
The examinee must also be informed of the arrangement procedures of the examination.

For a qualitative assessment of an employee's knowledge and skills, it is very important that during the examination each examinee sits at a separate computer and is evaluated under the guidance of an observer from the expert commission. According to the results of the examination, a certificate is issued confirming that the specialist has been qualified as a demographer of a certain level.

Implementation of the rules above at each stage will help to make the qualitative assessment of the qualifications of employees.

In the future, employees with a certificate of advanced training will be in greater demand in the labor market. Also, they may be promoted or placed in the personnel reserve for further promotion. Wages of employees will depend on the level of qualifications and position held. *Figure 2* demonstrates a demographer's career chart showing the relationship between skill level, position, and wages. Building such career programs for employees allows them motivating themselves to increase their qualification level in order to climb the corporate ladder and perform their job functions efficiently (Rychikhina, Evdokimova, 2021).

Figure 2. Demographer's career chart



Conclusion

As we can see, in order to preserve people, expand reproduction and improve quality of life throughout Russia (in regions, small towns and settlements), specialists are required who can build and study analytic demographic databases, prepare resources for the development of demographic plans, identify positive and alarming demographic trends, conduct expert examinations of economic and socially significant programs and projects. The quality of training and assessment of professional qualifications of specialists in demography will further influence the effectiveness of creation and implementation of projects to preserve the population and develop human potential of Russia. In this regard, resolution of this issue is currently of great importance (Cheng Xiumin et al., 2024; Shabunova et al., 2024).

Compliance with the organizational and methodological provisions proposed by the authors regarding the process of assessing professional qualifications of specialists in demography, as well as the rules and procedures within organizational and methodological support for the examination at each stage of employees' qualifications assessment will make it qualitative and will guarantee that leaders of the profession will come to work at government agencies and organizations. Only qualified demographers will be able, by analyzing demographic processes in various population groups, to develop a set of measures aimed at strengthening the institution of a multigenerational family, to create motivation in society to have many children; to propose effective measures aimed at increasing life expectancy and reducing mortality (Symanyuk et al., 2009).

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Socio-Economic Issues of the European North of Russia and the Geographical Aspect of Their Solution in Modern Conditions

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Abstract. The European North of Russia is considered as an economic region with specific characteristics of production and population settlement. A North European economy type with high natural resource potential, innovative geo- and biotechnologies, telecommunication systems and forms of organization of territorial communities of people adapted to difficult climatic conditions is being formed here. The socio-geographical aspect of the development of this economy type is manifested in the interests of the indigenous population to preserve and modernize the historically reclaimed areas of land. This involves overcoming obstacles in rational land use and forest management, reviving existence near rivers, lakes and sea gulfs, and strengthening territorial "center – periphery" ties. The choice of strategic directions for the development of the European North of Russia is significantly influenced by external conditions. They update topics related to the reaction to the world order transformation, the North Russian identity, the contact zone formation for the continental and maritime economies, food security, and the protection of Russia's Arctic interests from foreign interference threats. The issues of studying the European North of Russia are becoming more complex and require a purposeful scientific explanation, the creation of scientific and technological foundations of territorial management.

Key words: economic region, North European economy type, territorial economic system, typology, methodology, science and socio-economic development.

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Introduction

The issues of socio-economic development of the Russian North (with special attention to its Arctic zone) are studied with considerable effort by numerous research teams. Summarization of the results obtained on this topic[1] (Agranat, 1992; Agranat, 2007; Bashmakova, 2010; Lazhentsev, 2022; Pilyasov, 2016) revealed a trend of the shift of research interest from global and national issues of natural resource development to intra-regional matters related to the unsatisfactory northern way of life. A historical approach to understanding the reaction of local communities to the general transformations of spatial development in Russia and in the world order as a whole is becoming increasingly relevant (Brovina, 2018; Lapin, 2016; Lukin, 2013; Lytkina, Smirnov 2019; Neelov et al., 2011; Shvetsov, 2021; Werlen, 2001). This is a higher level of abstract thinking aimed at translating worldview ideas into solving practical tasks in a particular region of the country. Considering this shift, the author of this article has made *an attempt to geographically show the most significant issues caused precisely by the transformation of economic and social foundations of community development in the European North of Russia*. Three issues are considered: the formation of a large economic region, the substantiation of the North European type of territorial economic complexes, the preservation of previously reclaimed areas of land and their improvement.

The issue of the formation of a large economic region

The European North of Russia is most often considered as the Northern Economic Region (the republics of Karelia and Komi, the Arkhangelsk, Vologda, Murmansk regions, the Nenets Autonomous Area). It was separated from the Northwestern Economic Region in 1982, and since then its borders have remained unchanged; 4046 thousand people live on 1466.3 thousand km^2, this is 2.8% of the Russian population (2023); 3.8% of the gross domestic product (GDP) of the Russian Federation is produced here, and mining, forestry and fishing industries make up a large proportion of it.

Among the European economic regions, the Northern one is characterized by a relatively harsh climate and high natural resource potential for industrializing (Richter, 1966; Northern Economic..., 1992). In this respect, it is similar to the Asian regions of Russia, but, in contrast to them, it has more favorable environment, formed under the influence of the warm Atlantic current, the Gulf Stream, and a convenient economic and geographical location near Moscow and Saint Petersburg. Along with the growing importance of the Northern Sea Route and the Arctic as a whole in the national and global economy, the value of this region is increasing as the main springboard for the development and protection of high-latitude Russian territories and waters. A kind of contact zone between the continental and maritime economies, as well as between the geopolitical interests of Russia and Scandinavian countries has been formed here (Shubin, 2011).

Manufacturing and technological ties are significant in economic regionalization. It can be illustrated by the Northern Coal-Metallurgy Base created in the 1950s by combining Karelia and Kola iron ores, Pechora metallurgical coal, Cherepovets water and energy resources. It was the core of the Northern Economic Region. But the "coal and steel age" has passed, and the time has come for high technologies and microelectronic complexes. The former industry has become problematic in terms of territorial organization of productive forces. Technological improvements in some industries sometimes create difficulties for others. For example, the coal-to-gas switch of the Cherepovets regional power station led to the complete closure of the mining industry in Inta, and the intentions

[1] *K 30-letiyu Vologodskogo nauchnogo tsentra RAN* [To the 30th Anniversary of Vologda Research Center of RAS]. (2020). Vologda: VolRC RAS.

of Severstal's management to use gas and hydrogen instead of coke exacerbate the issues of coal mining in Vorkuta and the socio-economic development of this town.

Currently, spatial scientific, technological, economic, environmental and social integration is more important for regionalization. This circumstance unites the efforts and resources of the republics, regions, autonomous areas and municipalities for sustainable use of natural resources, infrastructure, sports and tourism development of territories, cultural events organization and other purposes of interregional co-working. We are talking about managed cooperation within the European North based on joint efforts of regional governments, municipalities and economic structures, research and educational centers (Kozhevnikov, 2023).

However, this raises the question: if the mentioned sources and drivers of regionalization are so clearly important (although ambiguous), then why do economic regions act as a formal appendage to the existing Russian strategic spatial planning system? In relation to the Northern Economic Region, this issue is very relevant. The fact is, there is no major organizing center yet. Only Arkhangelsk claims this status, considering its equidistant geographical location and the historical experience of the large Arkhangelsk Governorate and the Northern Territory (Shubin, 2005).

The joint development of the Northwestern and Northern economic regions is problematic. Saint Petersburg is losing (perhaps temporarily) its status as the "Window to Europe" and is increasingly focusing on the domestic Russian market. Its switch to the Arctic is particularly noticeable, to the benefit of the Russian European North regions. The most significant growth occurs in culture, high-tech medicine, science and education, design efforts and special installation work, logistics, and regional planning. Is this a solid reason to merge the two economic regions into one? There is no definite answer. In any case, constructive representation of the European North's economic activity specifics and its geographical location in the strategic spatial planning system of Russia remains perfectly legitimate.

The issue of organization of the North European type of territorial economic complexes

The typology of territorial production complexes was first carried out in 1947 by N.N. Kolosovskii (1958) on the basis of energy production cycles and production combinations formed around such cycles. However, he did not consider the northern territories within his typology due to their uncertain status in the economic regionalization of the country at that time, but singled out the "northern industry" for the future. V.A. Krotov (1964) scientifically substantiated the existence of the East Siberian type of productive forces. This is probably the only example of this kind of research. If it is projected onto the Northern Economic Region with an adjustment to modern conditions of social development, the following definition can be given provisionally: *the North European economy type is a mixture of territorial and industrial features including high natural resource potential, innovative geo- and biotechnologies, telecommunication systems and the specific way of life of the population adapted to difficult climatic conditions.*

According to this definition, the main production and technology guidelines of the Northern Economic Region can be formulated as follows:

– creation of energy-coal-oil-gas chemical complexes, where hydrocarbon resources are used mainly in chemical-technological processes, and the use as a fuel is auxiliary;

– complex processing of crude ore materials with extraction of scarce rare and rare earth metals, which are essential for increasing the level of technological self-sufficiency of the Russian economy;

– creation of a geo-mechanical monitoring system, ore beneficiation right at the points of extraction, hydrometallurgical processing methods,

laser scanning, nuclear physical and other methods for studying the properties of naturally occurring materials;

– introduction of new methods of mechanical and chemical processing of wood using its vital cells to obtain biologically active substances;

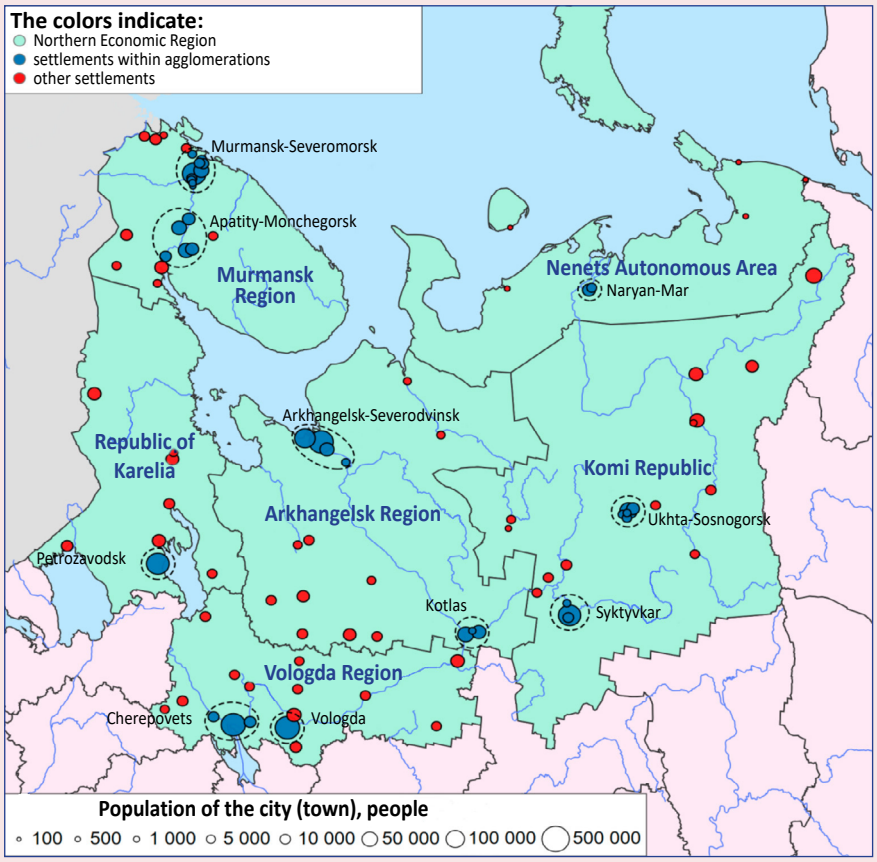
– installation of technological equipment for agricultural complexes, the structure of which covers the entire cycle of agriculture, animal husbandry and food production.

The listed above requires a systematic scientific and technological substantiation. The implementation of innovative technological projects designed at the Russian Academy of Sciences could significantly contribute to the formation of this economy type.

The study and development of *local forms of the economy and way of life organization* in the European North assumes a more fractional geographical typology. *Figure* shows one example of such a typology (Lazhentsev, 2015). The following elements are distinguished:

– *agglomerations that function as key structures* (Murmansk-Severomorsk, Apatity-Monchegorsk, Petrozavodsk, Vologda, Cherepovets, Arkhangelsk-Severomorsk, Kotlas, Syktyvkar, Ukhta-Sosnogorsk agglomerations). Naryan-Mar with the Iskateli village, designated in official documents as an agglomeration, is also included here, although its population is only 29 thousand people. Back in the early 2000s Vorkuta Urban Okrug was a striking agglomeration example in terms of population

The Northern Economic Region urban settlement map: agglomerations and peripheral industrial settlements (compiled by V.N. Lazhentsev, A.V. Smirnov)



Source: (Lazhentsev, 2015).

settlement and economic organization, but in recent years the villages surrounding Vorkuta are becoming deserted, and Vorkuta itself has ceased to be a key structure due to the lack of an "economic gravity field";

– *peripheral industrial cities and towns* (there are 67 of them in 2024, including the largest: Kandalaksha, Kovdor, Nickel, Pechenega, Kostomuksha, Segezha, Onega, Nyandoma, Vorkuta, Inta, Pechora, Usinsk, Vuktyl);

– *peripheral settlements with a predominance of country life* (villages remoted from key structures, some forest and "roadside" settlements).

This classification of settlements allows us to understand the most acute territorial development issues. In terms of agglomerations, they include the organization of inter-settlement rapid transit, environmental protection, and the participation of adjacent towns and villages in the formation of a common set of social services. The issues of the industrial periphery include the timely response to an increase or decrease in mining and timber harvesting, the search for an additional economic base for long-term development, and the organized resettlement of people. In rural areas, these are the conservation of agricultural land of "dying" villages, the resettlement of the population, the development of the local road network and information communications.

The issue of preserving previously reclaimed areas of land and their improvement

First of all, it is necessary to highlight self-identification of indigenous residents as Northerners, a historically established social community, a kind of symbiosis of North Slavic and Finno-Ugric ethnic cultures. People in the European North of Russia have been living there for centuries. Despite significant fluctuations in their numbers, the formed "cores" of vital activity are stable. Overcoming difficulties of land reclamation and modernization in line with the increasing needs of the national and global economic systems is a challenge that Northerners face today.

The economy of the European North is closely connected to resolving the issues of sustainable development of local communities within their historically established culture and economic traditions. Regionalization and localization of solutions to socio-economic problems is a kind of counterbalance to globalization, the danger of which can be seen in the exaggerated unification of the various societies' ways of life without careful consideration of their diversity, including the northern one.

The most difficult task is *the rational use of land resources* and the agricultural areas reclamation (at least partially), including arable land. Cultivated in the conditions of the North, this land is a huge historical acquisition, the highly important spiritual and socio-economic reality. However, this very wealth has largely fallen into disrepair during the years of revolutionary reform in the 1990s. The cultivated area in the European North decreased in 32 years (1990–2022) from 1318 to 455 thousand hectares, by 2.9 times; the rural population – from 1417 to 845 thousand people, by 1.7 times. Villages abandoned by their inhabitants who migrated to larger settlements seem to be extremely beneficial only at first glance. However, along with the departure of people, farmland disappears to such a large extent that the energetic metabolism of landscapes radically changes, most often not for the better.

Until recently, the food security issue was that Russia imported a lot of food, but now it is that Russia's own production does not meet the standards of safety for human health[2]. The northern territories (unlike many others) are most suitable for organic agriculture; they are less polluted with "bad chemicals" and are relatively easy to integrate into the adaptive landscape farming system (Maltseva, 2021; Shcherbakova, 2020).

[2] *Zemel'nyi potentsial Rossii: sostoyanie, problemy i mery po ego ratsional'nomu ispol'zovaniyu i okhrane: analiticheskaya zapiska* [Russia's Land Potential: Status, Issues and Measures for its Rational Use and Protection: Analytical Note]. (2023). Moscow: RAS. Available at: https://www.ras.ru/news/shownews.aspx?id=731db31a-c85e-4c9d-9249-240c9a2fbe28

Hopes for the preservation of the country life are associated with the revival of consumer cooperation (including traditional Northern crafts, mushroom and berry economies), with the development of bioenergy, gasification, the wooden housing industry, network systems of healthcare, education and consumer services. This can be possible only if there is a stable year-round transport system including, if necessary, river routes, floating (pontoon) bridges, winter roads, and small aircraft; telephone, post-and-telegraph, cellular, television networks, and high-speed fiber-optic and space communications.

The external aspect of the northern agriculture development is manifested in global warming trends and potential changes in natural conditions in the steppe and forest-steppe zones. Agriculture in the taiga zone of Russia will have to be promoted if required, including due to the critical state of the global food market.

The problems of spatial and territorial development in the European North are closely related to forest management. This activity is also predominantly rural and depends on the circumstances mentioned above. The biological and economic problems of taiga territories have been studied sufficiently to improve the entire forestry system (Modernization..., 2018). The hydrology of rivers, lakes, and sea gulfs is not so well researched. Meanwhile, restoring them to service requires a significant amount of hydraulic engineering work, organized on a scientific basis.

The time has come when *land use in general* should become one of the most important areas of economic activity. In this regard, we note that many issues of land use now have to be addressed to low-budget economic entities, and this often determines inefficiency of their consideration. The financial strains of territorial self-government societies and municipalities are especially noticeable for the population. Most of them do not have funds for engineering, geological, geophysical and biomedical surveys of problematic residential and industrial areas of land.

A constructive approach to resolving the land use issue is directly related to the recommendations of ecologists, biologists and physiologists. Some of them are: the creation of new technologies for "healing wounds" received by nature due to mining; the creation of artificial meadows in the tundra zone – a reliable forage for livestock; the use of special grazing regimes for deer and the preservation of mosses and lichens; the development of special rules and regulations for construction on permafrost; the organization of natural processes monitoring, which systematically examines interrelation between objects of fauna, flora and the biobased economy.

Let us pay attention to another aspect of land modernization – *energy*. Vologda Research Center of RAS has revealed that the proportion of housing with central heating and gas supply is decreasing more and more noticeably due to the active construction of apartment buildings and houses with individual heating systems, mainly working by electricity[3]. This reflects the general trend of utilities transformation, when the use of the heat in households becomes cheaper compared to central hot water supply. Moreover, if we take into account the increasing importance of country house ownership for people, this trend should be considered as the most important factor changing the structure of the end-use energy consumption. The use of individual heating systems is also beneficial for the far periphery, where it is more expedient to supply electricity than to build a gas pipeline or deliver fuel.

[3] Uskova T.V., Voroshilov N.V. (Eds). (2024). *Sotsial'no-ekonomicheskoe razvitie munitsipal'nykh obrazovanii Vologodskoi oblasti. 2000–2023 gg.: informatsionno-analiticheskii byulleten'. Vyp. 11.* [Socio-Economic Development of the Vologda Region Municipalities. 2000–2023: Information Analysis Bulletin. Issue 11]. Vologda: VolRC RAS.

In our opinion, the mentioned transformations should be based on the *geosystem approach* – the theory of natural complexes, "principles and methods of changing the earth's surface in the direction necessary for humans" (Sochava, 1978, p. 7). Introduction of the geosystem factor into the parameters of social reproduction actualizes the issue of natural resources capitalization (Dmitrieva et al., 2023). If the area of a particular geosystem has a set of useful properties and qualities considered in units of physical measurement, their totality should also have a cost estimate that can serve as a basis for subsequent, more specific calculations. The practical meaning of this position is explained by the need to accumulate financial resources sufficient to reproduce the natural resource potential of geosystems and create an environment conducive to human life.

Conclusion

The regional aspects of social reproduction have a traditional scientific explanation, pointing to the geographical division of labor and the characteristic of productive forces to combine into territorial production complexes. In this (traditional) respect, the European North of Russia has a fairly well-established scientific status of mineral and biobased specialization with deep processing of fresh raw materials using the latest technologies. The accelerated formation of the contact zone between the continental and maritime economies, as well as the need to protect Russia's geopolitical interests in the Arctic contribute to the novelty in the research agenda of the last twenty years.

But even more, the novelty is substantiated by the world order transformation and the awareness of territorial communities of their own role in the ongoing socio-political processes. Against this background, the interpretation of the North European type of the economy and way of life organization as a specific set of industrial and social processes serves as a kind of guideline for strategic planning. The fractional typology of the forms of territorial organization of the economy and settlement of the population is also of great importance, taking into account the relationship between urban agglomerations, industrial and rural periphery.

The most urgent issue in the European North is the preservation and development of historically reclaimed areas of land where the population rooted, using a new scientific and technical basis. To solve this problem, it is necessary to restore agriculture, considering its influence on ensuring food security and its importance as a link within the entire agricultural complex, create a new forest management system and enhance the role of local communities in its regulation, restore rivers, lakes, and sea gulfs to service. Changes in the energy structure due to the use of individual heating systems have a positive impact on households.

The reference to geosystem approach emphasizes that the effect of integrating scientific knowledge, including socio-economic knowledge, can be enhanced if the solution of complex issues is based on "end-to-end" research methodologies.

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The Impact of Road Transport Connectivity on Economic Growth of Regions: Econometric Modeling

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Abstract. For the Russian Federation, as the largest country in terms of area, the task of strengthening transport connectivity of territories: centers of economic growth, urban and rural areas, settlements within urban agglomerations, etc., is of exceptional importance. It is especially acute in the conditions of growing external sanctions pressure, which caused the need to multiply the strengthening of inter- and intra-regional ties of economic, migration, socio-cultural, scientific and technological nature. The aim of the research is to assess the impact of road transport connectivity on the economic growth of Russian regions. We used general scientific methods (analysis, synthesis, generalization) and methods of spatial econometrics to achieve it. In particular, we substantiated the existence of clustering of regions in the country space by level of per capita GRP and key indicators of motor transport connectivity based on the results of calculation of global and local Moran's spatial autocorrelation indices. As a result of the construction of multiple regression models with random effects with spatial lags (SAR, SEM, SDM, GSPRE models) and without them, the article shows that the greatest positive and statistically significant influence on the GRP of its subject is exerted by the factor concerning location of the region within the North of Russia, and on the GRP of other regions – by the density of highways. The scientific significance of the study consists in proving that the economic growth of each region of Russia in the period 2014–2022 was influenced by the level of intra-regional transport connectivity of both the subject itself and other regions. The results of our work contribute to the development of ideas about the impact of spatial factors on the economic growth of Russian regions and can be used by researchers in conducting research

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on similar topics, by public authorities in the development of strategic documents and specific projects for the development of territories.

Key words: road transport connectivity, economic space, region, economic growth, gross regional product, modeling, spatial autocorrelation.

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Introduction

It is strategically important to strengthen the transport connectivity[1] of territories (macro-regions, regions, core settlements, urban and rural areas, settlements within urban agglomerations, etc.), centers of economic growth, centers of scientific and technological development, enterprises and organizations that are links in the same value chains, participants in the same clusters, etc.) to ensure sustainable and balanced spatial development of Russia as the largest country in the world in terms of area. However, the range of positive effects that can be achieved by increasing transport connectivity of territories (improving the qualitative and quantitative characteristics of road and roadside infrastructure, means of transport, etc.), when examined in more detail, turns out to be wider and concerns not only the issues of effective organization of space and spatial development of territories.

For instance, strengthening transport connectivity in the economic sphere promotes the inflow of private investment, facilitates the entry of producers into new markets, reduces transport costs per unit of output by reducing economic and geographical distance, leads to the development of domestic tourism, facilitates the diffusion of innovations, increases the efficiency of the social division of labor, etc.[2] (Isaev, 2015; Uskova, 2021; Yao, Liu, 2022; Zhu, Luo, 2022; Wang, Yang, 2023). Yu.A. Shcherbanin notes that "the importance of developed transportation infrastructure for the country's economy is a kind of lemma, i.e. a proven statement..." (Shcherbanin, 2011).

Strengthening the transportation connectivity of territories in the social sphere increases the accessibility for the population of healthcare, education and other services guaranteed by the legislation of the country, raises the level and quality of life, contributes to the cultural integration of the country's space (Khudyakova, 2015; Francisco, Helble, 2017; Rim, An, 2022).

From the point of view of public and national security, transport infrastructure provides manageability and connectivity of the country's space, overcoming the periphery, economic, social, cultural

[1] Transport connectivity in the work is considered from the position of availability of transport communications (transport infrastructure) with regard to their development, sufficiency and quality, which meet all requirements in terms of modern challenges, provide development with regard to strategic objectives and the formation of an integral territorial socio-economic system (Kozhevnikov, Patrakova, 2024).

[2] Presentation and transcript of P.A. Lavrinenko's speech "Transport Connectivity as an Economic Growth Factor in Regions". IEF RAS. Available at: https://ecfor.ru/publication/transportnaya-svyaznost-kak-faktor-ekonomicheskogo-rosta-v-regionah/

isolation of territories (Gumenyuk, Gumenyuk, 2021; Taylor, D'Este, 2007), which is especially important for Russia in the conditions of external sanctions pressure, which aggravated the task of developing cooperation and integration ties within the country.

The variety of positive effects arising at the macro-, meso-, and microlevels when strengthening the transport connectivity of territories determines the development and implementation of special state programs and projects, for example, in Russia the national project "Safe Quality Roads"[3], the Comprehensive Plan for Modernization and Expansion of Trunk Infrastructure[4], the state program of the Russian Federation "Development of the Transport System"[5]. Moreover, one of the top-level strategic planning documents – the Strategy for Spatial Development of the Russian Federation for the period up to 2025[6] – among the key tasks in the field of spatial development are identified overcoming infrastructure limitations of federal significance and increasing the availability and quality of trunk transport infrastructure, reducing the level of inter- and intra-regional differentiation by improving the transport accessibility of rural areas, etc. The Strategy for Spatial Development of the Russian Federation for the period up to 2025 is one of the key tasks in the field of spatial development.

However, despite the understanding of the critical importance of strengthening transport connectivity[7], in particular road transport connectivity, by representatives of public authorities and the scientific community, the issues related to qualitative and quantitative assessments of its impact on the economic growth of Russian regions remain poorly studied and debated. In accordance with the abovementioned, the purpose of this paper is to assess the impact of road transport connectivity on the economic growth of Russian regions.

The research hypothesis is that the economic growth of each Russian region is influenced by the level of intraregional road transport connectivity of its own and other regions.

The purpose and hypothesis of the work required solving the following tasks: to substantiate and test the methodological approach to assessing the impact of road transport connectivity on the economic growth of Russian regions; to assess the impact of road transport connectivity of territories on the economic growth of Russian regions.

Theoretical and methodological foundations

Modern scientific literature can distinguish three main methodological approaches to assessing the impact of transport connectivity indicators on the territories' economic growth of different hierarchical levels (countries, macro-regions,

[3] Passport of the national project was approved following the results of the meeting of the Presidium of the Council under the President of the Russian Federation for Strategic Development and National Projects on December 24, 2018.

[4] Approved by RF Government Resolution 2101-r on September 30, 2018.

[5] Approved by RF Government Resolution 1596 on December 20, 2017 (as amended and enacted as of January 1, 2022, by Government Resolution 2442 on December 24, 2021).

[6] Approved by RF Government Resolution 207-r, dated February 13, 2019.

[7] An earlier study shows that it is road transport that is the most bottleneck in the infrastructural development of Russia's vast territories (Kozhevnikov, Patrakova, 2024). Moreover, in the International Competitiveness Rating on the quality of transportation infrastructure in 2020, Russia was in 50th place out of 144 countries surveyed; the lowest positions – 123rd place – were precisely for the quality of highways (Chistyakov P. (Ed). (2018). *Integrated Transport System*. Moscow: Center for Strategic Research. 278 p. Available at: https://www.csr.ru/uploads/2018/05/Report-Traffic-Infrastructure-2.0.pdf (accessed: August 20, 2023)).

The study of connectivity provided by other modes of transportation was not conducted in this paper due to the lack of sufficient official statistical data.

regions, municipalities, etc.). The first approach is associated with the use of new indices, indicators, indicators, matrices, etc. developed by the authors or already existing and publicly available; the second approach involves the use of traditional econometrics tools, mainly regression models; the third one implies application of methods and tools of spatial econometrics.

For example, we can include the study by E.S. Kuratova to the works that use the first approach to assess the impact of connectivity on various indicators of territories' socio-economic development (Kuratova, 2014). It proposes the author's formula for determining the weighted average cost of time required for a transportation user to reach a certain point of arrival (e.g., hospital, school, etc.) from any other departure points of the region; its testing was carried out on the example of municipal districts of the Komi Republic. The paper (Kudryavtsev, Rudneva, 2014) proposes a methodology based on a matrix for assessing the impact of transport infrastructure on the socio-economic development of the region. In general, the key advantage of the first approach is the relative simplicity of calculations and interpretation of the results; the disadvantages are the lack of extensive testing and validation (this is mainly characteristic of new indicators), taking into account the impact of a relatively small number of indicators and the lack of opportunities for modeling and forecasting the impact, which is extremely important for the practice of public administration.

These shortcomings are mitigated by the use of econometric modeling tools (the second approach to impact assessment). By building regression models, researchers estimate, simulate and forecast the impact of various indicators of transport connectivity on the economic growth and development of one specific territory over a period of time (using temporal data; see, for example (Pyan'kova, Zakolyukina, 2024)), several territories – within federal districts, individual clusters, etc.), at one point in time (when using spatial data; see, for example (Goridko, Roslyakova, 2014; Infrastructure of spatial..., 2020)), several territories within several points in time (when using panel data; see, for example (Kolchinskaya, 2015; Transport and energy ..., 2022)). It is worth noting that the construction of such models does not take into account the location of territories in the economic space relative to each other and spatial dependencies between them (the influence of some territories on others). Meanwhile, modern applied and fundamental theoretical works testify to the importance of taking into account the spatial factor. For instance, the basic and enduring, despite the active infrastructural development, laws of geography by W. Tobler say: "Everything is connected with everything, but close things are more connected than distant things"; "a phenomenon external to the area of interest (geographical) affects what happens inside it" (Tobler, 1970; Tobler, 2004).

This limitation is eliminated when using spatial econometrics tools, in particular, spatial autocorrelation indices and spatial regression models (the third approach to assessment). Unlike the tools and methods of economic research presented above, they allow assessing not only the impact of connectivity in the region on its economic growth, but also the impact of connectivity of its "neighbors". This becomes possible by taking into account spatial lags – weighted average values of "neighbors" observations for each analyzed spatial unit (in our study – for each region). In this case, when choosing the boundary matrix as a weighting matrix, the regions that share a common border[8] with it are the "neighbors" for the i-th region;

[8] Each element of the weighting matrix identifies the spatial relationship between territories i and j. Its use is a prerequisite for building spatial regression models and calculating the spatial autocorrelation index.

when choosing the inverse distance matrix, the "neighbors" are all other regions; when choosing the language matrix, the regions whose population speaks the same language, etc.

Among the Russian works that use this approach, the study by E.A. Kolomak (Kolomak, 2011) stands out, where econometric modeling with spatial lags is used to assess the impact of infrastructural capital on labor productivity and gross regional product, the idea of which is to expand the production function by including infrastructural capital and external effects of neighboring regions. At the same time, the author calculates Moran's spatial autocorrelation index. According to calculations, transportation infrastructure, namely railroads and roads, was not an economic growth factor in Russia as a whole in Russian regions in 1999–2007. However, if we distinguish the western and eastern parts of the country, the situation changes: in the former, railroads turn out to be more productive and significant than in the latter, despite the widespread opinion about the limiting role of transportation infrastructure specifically in Siberia and the Far East. Moreover, infrastructure elements create externalities that affect the economic performance of neighboring territories; they are also stronger in the European part of the country (Kolomak, 2011).

A.G. Isaev's work assesses the impact of transportation infrastructure – roads and railroads – on the economic dynamics of the RF constituent entities in 2000–2013. The multiple regression model built for this purpose, including the time lag of the dependent variable – gross regional product – allowed drawing extremely interesting conclusions. For example, the author revealed a positive relationship between the development of road transport networks and economic growth of Russian regions as a whole, and a negative relationship between the development of transport networks in a region and the economic growth of its neighboring regions (Isaev, 2015). In addition, the estimates obtained separately on the materials of the eastern territories of Russia did not reveal a positive contribution of transport infrastructure to regional growth (gross regional product), which is generally consistent with the results obtained earlier by E.A. Kolomak.

Spatial econometric tools are more actively used abroad to assess the transport connectivity of territories at different hierarchical levels (cities, regions, etc.). For instance, the paper (Shi et al., 2024) investigates the impact of transportation infrastructure on the economic development of PRC cities using Moran's spatial autocorrelation and the construction of spatial regression models SAR, SEM, SDM. The results of the author's calculations show that the growth of transportation by road and water transport, civil aviation significantly increases economic activity in cities, stimulating domestic trade, industrial production, etc. The expansion of the area and the rise in the operational length of urban roads and the length of expressways also stimulate economic activity. In contrast, the impact of road and water transport passenger traffic on economic activity was relatively insignificant, although the authors note that an efficient passenger transport system plays an undeniable role in facilitating labor mobility that supports sustainable urban development (Shi et al., 2024). The study (Karim et al., 2020) evaluated the impact of transportation infrastructure on economic growth of 34 provinces in Indonesia by constructing spatial regression models SLX, SAR, SEM, SDM, SDEM, SAC and mixed model SAC. The comparison of the models according to Akaike's information criteria and the significance of "rho" and "lambda" coefficients allowed choosing the best model among them, which turned out to be the mixed SAC model. Interpreting this model, the authors indicate that the development of provincial bus infrastructure

has a positive and significant effect on economic growth in the neighborhoods (there is an indirect effect). Conversely, improving airport and road infrastructure in a province will not cause spillover effects in the form of transfer of production factors to neighboring provinces (Karim et al., 2020). Using a similar toolkit on the example of 41 cities located in the Yangtze River Delta (PRC), it was proved that the transport infrastructure of cities not only contributes to their own economic growth, but also has a positive spatial impact on the economic growth of neighboring cities in the sample (Wang et al., 2022).

In general, the review of scientific literature shows that the works of Russian authors devoted to assessing the impact of transport connectivity on the economic growth of Russian territories rarely take into account spatial dependencies in comparison with foreign works on similar topics. However, as noted by O.S. Balash, it is econometric models that take into account spatially distributed socio-economic processes and detect the economic and social impact of neighboring regions that are extremely important for forecasting and management in the strategic planning of regions and cities (Balash, 2012).

Materials and methods

The information base of the research was the open data of Rosstat on the volume of gross regional product (in this study it acts as an aggregate indicator characterizing economic growth) and the level of development of road transport infrastructure in 2014–2022 in 83 constituent entities of the Russian Federation. Due to the lack of statistical data, information on the Donetsk People's Republic, Lugansk People's Republic, Zaporozhye Region, and Kherson Region was left out of the research. *Table 1* gives the description of the variables used in the study.

The methodological approach to assessing the impact of transport connectivity on the economic development of Russian regions is implemented in three stages and is based on the use of spatial econometrics methods tested in the Russian and international scientific community.

At the first stage, the indicators selected for analysis are characterized using basic descriptive statistics (mean, maximum, minimum values, standard deviation), and the presence or absence of multicollinearity between exogenous variables is checked. At the same time, the variables that are found to be strongly correlated (correlation coefficient exceeds 0.7) are excluded from further analysis.

At the second stage, the global and local Moran's spatial autocorrelation indices are calculated, and Moran's scatter matrix is constructed for the endogenous variable and exogenous variables of interest[9], which, within the framework of this study, will allow identifying the presence/absence in the period 2014–2022 and the composition of clusters of regions similar in terms of GRP level, road density, number of passenger cars, etc., taking into account the measure of their spatial proximity. Such proximity of regions within the research framework is formalized on the basis of the weight matrix of inverse distances on highways between the administrative centers of the regions. Its choice among others is conditioned by the assumption of gradual "fading" of the intensity of interaction between territories as the distance between them increases. For comparison, the binary neighborhood matrix assumes that regions that do not have common borders have no interaction (Isaev, 2015).

In fact, the presence of clustering of regions confirms the relevance and necessity of taking into account spatial lags when assessing the impact of transport connectivity on the economic development of Russian regions.

[9] A detailed description of the methodology for calculating and visualizing the spatial autocorrelation using P. Moran's methodology is presented in (Okunev, 2024).

Table 1. Variables used in the study

No.	Name of indicator, units of measurement	Designation	Data source or calculation method
Endogenous variable			
1	Gross Regional Product (GRP), thousand rubles per 1 person	GRP	Calculated according to Rosstat data by dividing GRP converted to comparable prices in 2022 using the GRP physical volume index by the average annual number of population
Exogenous variables of interest			
2	Density of public roads with paved surface, kilometers of tracks per 1,000 inhabitants	Road	Calculated according to Rosstat data by dividing the length of paved public roads by the average annual number of population
3	Share of rural settlements connected by paved roads to the public road network in the total number of rural settlements, percent	Rural_road	Rosstat (EMISS)
4	Number of passenger cars owned by citizens, units per 1,000 persons of the population	Car	Rosstat
5	Number of trucks in organizations, units per 1,000 persons of population	Truck	Calculated according to Rosstat data by dividing the number of trucks in organizations of all types of economic activity by the average annual number of population
6	Number of public buses, units per 100,000 inhabitants	Bus	Rosstat
7	Location of the constituent entity of the Russian Federation in the territory of the European or Asian North of Russia	Dummy	For subjects located in the territory of the European or Asian North of Russia, the variable is taken as "1", outside it – "0".
Exogenous control variables			
8	Commissioning of residential buildings, square meters of total floor area of residential premises per 1,000 population	House	Rosstat
9	Volume of innovative goods, works, services, percentage of the total volume of shipped goods, works, services performed	Innov	Rosstat

Note: The European North of Russia includes the Arkhangelsk Region, with the Nenets Autonomous Area, the Vologda and Murmansk regions, the Komi and Karelia republics; the Asian North of Russia includes the Tyumen Region, including the Yamal-Nenets and Khanty-Mansi autonomous areas, the Krasnoyarsk Territory, the Republic of Sakha (Yakutia), the Chukotka Autonomous Area, the Magadan Region, and the Kamchatka Territory, all or most of the territory of which is located above the 60th parallel of the northern latitude. Indicator no. 3 for Saint Petersburg is assumed to be 100% due to the absence in the Rosstat database.
When selecting the indicators included in the model, we took into account the availability of complete (without omissions) series of statistical data of Rosstat in the territorial (by regions) and temporal (by years) sections, which is the basis for the construction of balanced panels. The inclusion of the dummy variable is due to the objective need to take into account the specifics of the northern regions of the Russian Federation, characterized by the focal point of settlement, location of productive forces, infrastructure, the predominance of extractive industries in the economic structure, the complexity of natural and climatic conditions.
Source: own compilation.

At the third stage, a multiple regression model is built on panel data, the use of which reduces the dependence between exogenous variables, reduces the standard errors of estimates, to a certain extent solves the problem of bias caused by unobserved heterogeneity of data, and has a number of other advantages over time and cross-sectional data. At the same time, certain assumptions / limitations due to the set of analyzed variables are taken into account when building the model. First, since the model contains exogenous variables that do not change over time (in particular, a dummy variable that takes the value of "1" and "0" throughout the analyzed period), a model with random effects was built. Second, the indicator of per capita GRP was included in the model in logarithmic form, since it is

a cost indicator. As a result, the multiple regression model under construction is as follows:

$$\ln GRP_{it} = \beta_0 + \beta_1 \times Road_{it} + \beta_2 \times Rural_{road\,it} + \\ + \beta_3 \times Car_{it} + \beta_4 \times Truck_{it} + \beta_5 \times Bus_{it} + \\ + \beta_6 \times Dummy_i + \beta_7 \times House_{it} + \beta_8 \times Innov_{it} + u_i + \varepsilon_{it}, (1)$$

where GRP_{it} – GRP of the i-th region in year t, thousand rubles per 1 person;

$Road_{it}$ – density of paved public roads in i-th region in year t, km of tracks per 1,000 population;

$Rural\_road_{it}$ – share of rural settlements in i-th region in year t that are connected by paved roads to the public road network in the total number of rural settlements, %;

Car_{it} – number of passenger cars owned by citizens of i-th region in year t, units per 1 thousand people;

$Truck_{it}$ – number of trucks in organizations of i-th region in year t, units per 1 thousand people;

Bus_{it} – number of public buses in i-th region in year t, units per 100 thousand people;

$Dummy_i$ – dummy variable characterizing the location of i-th region ("on" or "outside" the territories of the European and Asian North of Russia);

$House_{it}$ – commissioning of residential buildings in i-th region in year t, sq. m. of total floor area of residential premises per 1 thousand people;

$Innov_{it}$ – volume of innovative goods, works, services in i-th region in year t, % of the total volume of shipped goods, works, services;

u_i – individual effect of i-th region (random variable);

ε_{it} – random mistake;

β – regression coefficients.

To test the hypothesis of the study, we constructed different model specifications most commonly used in similar works: without and with spatial lags, namely the spatial autocorrelation model SAR, which takes into account the lag in the dependent variable, the spatial error model SEM, which takes into account the mutual influence of unobserved variables, the spatial Durbin SDM model, which includes spatial lags of both the dependent and independent variables, the GSPRE model, which includes all kinds of spatial interaction[10].

We made calculations according to the above methodological approach using Stata, Gretl, and Microsoft Office software products.

Research results

Descriptive statistics and assessment of correlation between the indicators selected for the study

Descriptive statistics of the variables used shows that the most uneven distribution among the regions of the Russian Federation is charac-

Table 2. Descriptive statistics of variables

Variable	Average value	Minimum	Maximum	Standard deviation
GRP	977.59	156.06	1262	1560.6
Road	13.8	0.5	47.0	7.6784
Rural_road	73.584	2.4	100.00	21.008
Car	301.06	38.437	576.22	70.998
Truck	4.9921	0.023959	23.883	2.6769
Bus	115.35	29.475	374.16	46.557
House	523.59	26.0	1970.0	261.06
Innov	5.3594	0.0	60.1	5.7791
Source: own compilation.				

[10] A detailed description and characteristics of the models are presented, for example, in (Gafarova, 2017).

Table 3. Correlation matrix

Variable	l_GRP	Road	Rural_road	Car	Truck	Bus	Dummy	House	Innov
l_GRP	1	-0.1143	-0.5595	0.1966	0.6002	-0.2494	0.6369	-0.0026	-0.0353
Road		1	-0.2834	-0.0920	0.3608	-0.1021	0.0836	-0.2092	-0.1779
Rural_road			1	0.0051	-0.5688	0.1501	-0.4258	0.1113	0.0152
Car				1	0.0285	-0.0138	0.1211	0.075	0.0472
Truck					1	-0.1998	0.4884	-0.0931	-0.0465
Bus						1	-0.1529	-0.018	0.0242
Dummy							1	-0.1968	-0.1711
House								1	0.1563
Innov									1

Note: hereinafter l_GRP is the natural logarithm of GRP.
Source: own compilation.

teristic of the indicators of per capita GRP (standard deviation is 1560.6, and the minimum and maximum values are 6.3 and 1.3 times less and 1.3 times more and less than the average value, respectively; *Tab. 2*) and the volume of commissioning of residential buildings (standard deviation is 261.06, the minimum and maximum values are 20 and 3.8 times less and more than the average value). In turn, the most uniform distribution is characteristic of the indicators of the number of trucks in organizations and the volume of innovative goods, works, and services.

We constructed a correlation matrix to identify the presence/absence of multicollinearity (*Tab. 3*). According to the data presented in it, all exogenous variables are characterized by weak and moderate correlation dependence on each other (correlation coefficient less than 0.7), which allows them to be used further in this study.

Algebraic visualization of spatial autocorrelation

Table 4 presents the results of calculation of global Moran's spatial autocorrelation indices characterizing the similarity of location to the studied endogenous variable and exogenous variables of interest in Russian regions. According to the 2022 results, positive spatial autocorrelation is recorded with respect to the indicators of per capita GRP, road density, the share of rural settlements connected to the public road network, the number of cars and trucks per 1 thousand people. It means that the regions characterized by higher values of any of the above indicators are usually neighboring with the regions that also have high values of the indicators. Regions with relatively low values of the indicators also neighbor predominantly with each other. Negative autocorrelation, which is much less frequent in scientific studies, was recorded with regard to the number of public buses per 100

Table 4. Global Moran's spatial autocorrelation indices for endogenous variable and exogenous variables of interest

Variable	Год								
	2014	2015	2016	2017	2018	2019	2020	2021	2022
GRP	0.046**	0.044**	0.042**	0.043**	0.047***	0.048***	0.050***	0.050***	0.047***
Road	0.052**	0.053**	0.054**	0.055**	0.056**	0.057**	0.057**	0.058***	0.059***
Rural_road	0.094***	0.099***	0.085***	0.091***	0.091***	0.090***	0.090***	0.088***	0.088***
Car	0.097***	0.094***	0.105***	0.058***	0.032	0.027	0.032*	0.037*	0.039*
Truck	0.124***	0.120***	0.093***	0.102***	0.099***	0.107***	0.086***	0.112***	0.096***
Bus	-0.018	-0.006	-0.009	-0.035	-0.019	-0.018	-0.033	-0.101***	-0.114***

Note: *** p-value < 0.01; ** p-value < 0.05; * p-value < 0.1.
Source: own compilation.

thousand people. That is, regions characterized by a relatively high number of buses per 100,000 people are often adjacent to regions with a relatively low number of buses. This indicates a high degree of heterogeneity in the development of the public transportation system represented by buses in this study.

However, the most significant conclusion that follows from the results of calculating the global Moran's indices, namely their statistical significance, is that spatial dependence should be taken into account when building a regression model of the impact of road transport connectivity on the economic growth of Russian regions.

Cartographic visualization of spatial autocorrelation

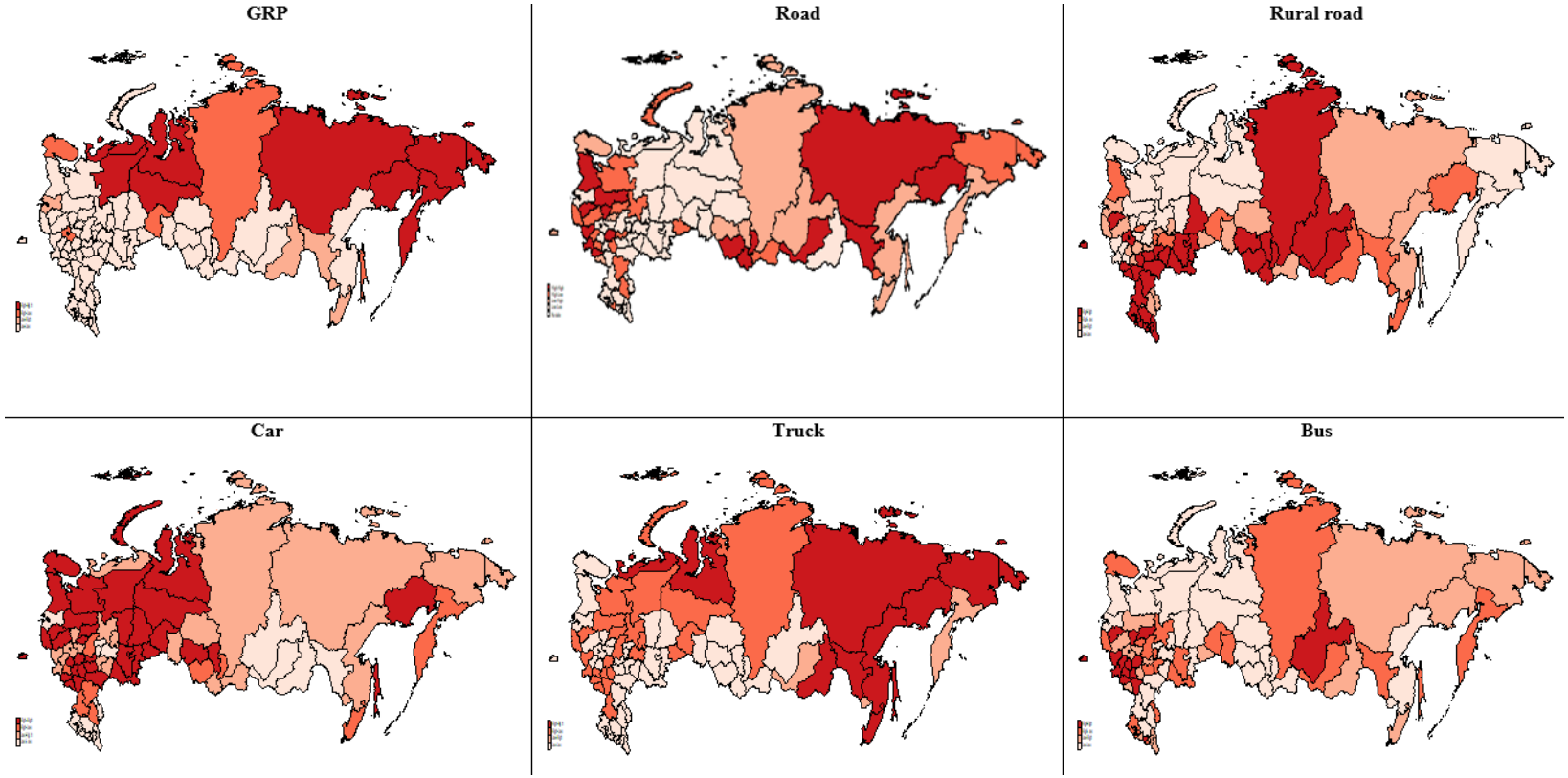
The analysis of spatial autocorrelation with the help of Moran's scatter diagram allowed distributing the studied Russian regions into four clusters (quadrants of the diagram) depending on the features of their spatial location and the level of the analyzed attributes. For instance, the regions in the HH (High-High) cluster have relatively high intrinsic values of the analyzed indicator and are surrounded by regions with relatively high values of the indicator. The regions of the LL (Low-Low) cluster, on the contrary, have relatively low eigenvalues of the analyzed indicator and are surrounded by regions with relatively low values of the indicator. Regions in the HL (High-Low) cluster have relatively high eigenvalues of the analyzed indicator, but are surrounded by regions with relatively low values of the indicator. The regions of the LH (Low-High) cluster, on the contrary, have relatively low eigenvalues of the indicator, but are surrounded by regions with relatively high values of the indicator. With a certain degree of conventionality, we can say that the regions of clusters HH and HL represent the centers / cores characterized by the highest values of the analyzed indicators, while the regions of clusters LL and LH are peripheral territories.

The *Figure* demonstrates the cartographic visualization of the regions' distribution by endogenous variable and exogenous variables of interest. In general, it visually confirms once again the presence of positive spatial autocorrelation among the constituent entities of the Russian Federation, i.e. that the subjects are not located chaotically, but form territorial clusters.

It is interesting and quite expected that the cartograms coincide to a certain extent for the indicators of per capita GRP and the number of trucks in organizations, since in Russia the leaders in terms of GRP per capita are mainly northern regions, where the extractive and manufacturing industries have a significant share in the economic structure. It is truck transportation that ensures its uninterrupted functioning (supply of raw materials, materials, equipment, sales of finished products, transportation of semi-finished products between shops, etc.)[11]. At the same time, a significant part of the regions of the Northwestern (e.g., the Komi Republic, the Arkhangelsk, Murmansk, and Vologda regions) and Ural (the Tyumen Region, the Khanty-Mansi and Yamal-Nenets autonomous areas) federal districts are in the HH cluster in terms of the number of passenger cars per 1,000 people, and in terms of road density per 1,000 people, it is LL cluster. In our opinion, this confirms with a certain degree of conventionality the well-known thesis about the underdevelopment of road infrastructure in Russia's northern regions.

[11] The present study of spatial autocorrelation did not analyze transportation by rail, sea, water, and pipeline transport, which also play a significant role in ensuring the smooth functioning of industry.

Cartograms of the distribution of Russian regions by quadrants of Moran's scatter diagram by GRP (thousand rubles per 1 person; GRP), density of paved roads (km of roads per 1 thousand people; Road), share of rural settlements connected by paved roads to the public road network (%; Rural_road), number of passenger cars owned by citizens (units per 1 thousand people; Road), number of cars owned by citizens (units per 1 thousand people; Rural_road). ; Road), share of rural settlements connected by paved roads to the public road network (%; Rural_road), number of passenger cars owned by citizens (units per 1,000 people; Car), number of trucks (units per 1,000 people; Truck), number of public buses (units per 100,000 people; Bus)



Note: due to the limited databases of cartographic and statistical data, data on the Republic of Crimea and Sevastopol, the Donetsk People's Republic, the Lugansk People's Republic, the Kherson and Zaporozhye regions are not presented. The fill colors of the regions correspond to the quadrants of Moran's scattering matrix:

HH	HL	LH	LL

Source: own compilation.

Output of spatial multiple regression models results

Within the framework of the study, 5 model specifications for panel data with random effects were constructed *(Tab. 5)*. At the same time, one of the main issues is the choice of one best model among the presented models. First of all, it is worth noting that the results of Moran's spatial autocorrelation analysis indicate that it is reasonable to take spatial effects into account in the model (accordingly, the model without taking spatial effects into account is excluded from further analysis). To select the best model among SAR, SEM, SDM and GSPRE, the Akaike and Schwartz information criteria and the adjusted coefficient of determination were compared. This allowed identifying as the best model SDM, which is characterized by the lowest value of the Akaike (-2,086) and Schwartz (-1,994) coefficients, the highest value of the coefficient of determination (0.466). *Table 6* presents more detailed descriptive statistics of the SDM model, including spatial lags and spatial effects.

Table 5. Model estimation results for panel data with random effects with and without spatial lags

Indicator	Model specification				
	No spatial effects	With spatial effects			
		SAR	SEM	SDM	GSPRE
Regression estimates					
Road	0.012***	-0.000	-0.003	-0.005**	-0.005**
Rural_road	-0.001	-0.000	-0.000	-0.000	0.000
Car	0.001***	0.000***	0.000**	0.000	0.000*
Truck	-0.005***	-0.006***	-0.007***	-0.007***	-0.007***
Bus	-0.000**	0.000	0.000	0.000*	0.000
Dummy	0.532***	1.134***	1.259***	0.963***	1.101***
House	0.000	0.000	-0.000	-0.000	-0.000
Innov	-0.001	0.000	0.001*	0.001**	0.001
Constant	6.035***	0.980***	6.294***	3.760***	6.298***
Spatial autocorrelation coefficients					
Spatial					
rho		0.822***		0.463***	
lambda			0.895***		1.097***
phi					1.691***
Variance					
lgt_theta		-3.567***		-3.585***	
sigma2_e		0.002***	0.002***	0.002***	
ln_phi			5.186***		
sigma_mu					0.497***
sigma_e					0.041***
Akaike Information Criteria (AIC) and Schwartz Information Criteria (BIC)					
AIC	1651	-2033	-2013	-2086	-2017
BIC	1689	-1977	-1957	-1994	-1957
Adjusted coefficient of determination					
R-squared		0.437	0.405	0.466	0.404

Note: *** p-value < 0.01; ** p-value < 0.05; * p-value < 0.1. The dependent variable is l_GRP. The significance of inclusion of the dummy variable was confirmed by the Wald test. The number of observations is 765 units. Algebraic form of the SDM model:

$\ln GRP = 3.760 - 0.005 \times Road - 0.000 \times Rural_{road} + 0.000 \times Car - 0.007 \times Truck + 0.000 \times Bus + 0.963 \times Dummy - - 0.000 \times House + 0.001 \times Innov;$

under the model under consideration, all other things being equal, the GRP of the regions comprising the European and Asian North of Russia (Dummy = 1) is almost 2.6 times higher than the GRP of other regions (Dummy = 0).
Source: own compilation.

Table 6. Regression estimates, spatial lags and spatial effects model for panel data with random effects with SDM spatial lags

Variable	Regression coefficients (β)	Spatial lags in exogenous variables (Wx)	Direct effects (LR_Direct)	Indirect effects (LR_Indirect)	Total effects (LR_Total)
Road	-0.005**	0.045***	-0.004*	0.080***	0,076***
Rural_road	-0.000	-0.017***	-0.001	-0.033***	-0.034**
Car	0.000	0.001*	0.000	0.001*	0.001**
Truck	-0.007***	0,005	-0.007***	0.004	-0.003
Bus	0.000*	-0.000	0.000*	-0.000	-0.000
Dummy	0.963***	1.583	1.014***	3.772	4.787**
House	-0.000	0.000**	-0.000	0.000**	0.000***
Innov	0.001**	-0.004	0.001*	-0.006	-0.005

Note: *** p-value < 0.01; ** p-value < 0.05; * p-value < 0.1.
Source: own compilation.

Based on the results of the calculations, we can draw the following key conclusions regarding the SDM model.

1. The spatial autocorrelation coefficient rho[12] in the model under consideration is statistically important at the 1% significance level (see Tab. 5). This means that there are global spillover effects, reflecting the influence on the per capita GRP of each particular region not only of its immediate neighbors, but also of the neighbors of the second, third, etc. order. The positive sign of the coefficient indicates that the growth/decrease of GRP in one region results in the growth/decrease of GRP in neighboring regions[13] (Demidova, Timofeeva, 2021), assuming the same influence of neighboring regions on each region, i.e. the constancy of the rho coefficient.

2. The coefficient at spatial lags theta[14] is statistically significant and negative. This allows saying that as the values of exogenous variables in neighboring regions increase, the opposite changes of the endogenous variable occur in the region under consideration (assuming the same influence of neighboring regions on each region, i.e. the constancy of theta coefficient).

In general, the SDM model confirmed the statistically significant impact of road density (lag 0.045; see Tab. 6), the number of passenger cars (lag 0.001) per 1,000 population, and the share of rural settlements connected by paved roads to the public road network (lag -0.017) in neighboring subjects on each region. The positive impact of road density and the number of motor vehicles of citizens looks quite natural: with their increase, the population and businesses get additional opportunities to make more business, tourist and other trips, including to neighboring regions[15]. If we take into account that the main GRP volume is created mainly in cities and urban agglomerations, in urban-type mining/processing settlements, the negative impact of increasing the connectivity of rural areas also looks natural with a certain degree of convention. However, in our opinion, this should not become a determining factor for federal and regional government authorities when making decisions on the development of the country's transport infrastructure; it is necessary to take into

[12] Coefficient before the spatial lag of the endogenous variable.

[13] Demidova O.A. (2023). NUG seminar "Assessing the impact of macro shocks on socio-economic processes in Russian regions. Basic spatial econometric models and their application to Russian data. National Research University Higher School of Economics. Available at: https://economics.hse.ru/mirror/pubs/share/824652359.pdf

[14] Coefficient before spatial lags of exogenous variables.

[15] Provided that the density of highways is increased by building them rather than decreasing the population, cars in citizens' possession is increased by directly increasing their number rather than decreasing the population.

account the overall social significance of increasing the connectivity of rural areas in the country's space.

3. Since in the spatial model among the explanatory factors, there are spatial lags of independent variables, it is necessary to interpret not the coefficient estimates, but the estimates of spatial effects for the factors under consideration (Demidova, Timofeeva, 2021). Table 6 presents the effects calculated on average for all 83 Russia's regions analyzed. According to these data, in particular the average overall effect, the change in gross regional product in each i-th region is statistically significantly affected by the change in all regions of the indicators 1) road density, 2) the share of rural settlements connected by paved roads to the public road network, 3) the number of passenger cars, 4) the location of the RF constituent entities in the European or Asian North of Russia, 5) the per capita volume of commissioning of residential buildings, with the second one having a negative effect, and the second one having a negative effect.

In addition, the analysis of direct spatial effects allows concluding that the greatest positive and statistically significant impact on the volume of per capita GRP of the i-th region has the factor concerning the region's location in the European or Asian North of Russia. This is generally explained by the resource specialization of the economy of the northern territories, which helps to form a significant GRP volume, and their relatively low population density. In turn, as a result of the analysis of indirect spatial effects, we can conclude that the greatest positive and statistically significant impact on the volume of per capita GRP of the i-th region is produces by the density of roads in other Russia's regions, due to the fact that roads are the main type of infrastructure used for the movement of the population, representing the key final consumer in the economic system, demanding a huge number of goods, works and services.

In general, most indicators of road transport connectivity are characterized by a complex role in increasing the GRP level of Russian regions, since the signs of direct and indirect effects for the same indicators are different in most cases.

Conclusions

The study assesses the impact of road transport connectivity on the economic growth of Russian regions. For this purpose, we propose a methodological approach based on the spatial econometrics toolkit. Its application allowed obtaining the following key results.

First, by calculating Moran's spatial autocorrelation coefficients, we found that there is a positive spatial autocorrelation among the RF constituent entities in terms of per capita GRP and most indicators of motor transport connectivity (road density, the share of rural settlements connected to the public road network, the number of cars and trucks per 1,000 people). As a rule, regions characterized by higher values of any of these indicators are adjacent to regions that also have high values of the indicators. Regions with relatively low values of indicators also neighbor predominantly with each other. It means tat the subjects are not located chaotically, but form territorial clusters, directly visualized on cartograms. At the same time, the statistical significance of global Moran's indices for the variables used in the study indicated the need to take into account spatial dependence when building a regression model of the impact of road transport connectivity on regional economic growth.

Second, the construction and then comparison of several regression models with and without spatial lags allowed establishing that the best model is the SDM model, which takes into account lags for endogenous and all exogenous variables. In the course of its interpretation, we revealed that spillover effects take place in the Russian regions in terms of per capita gross regional product: the GRP

level of each region is positively affected by the level of GRP of its neighbors of the first, second, third, etc. order. At the same time, the change in gross regional product in each i-th region is statistically significantly influenced by the change in all Russian regions in such indicators of motor transport connectivity as the density of roads per 1,000 people, the share of rural settlements connected by paved roads to the public road network, the number of passenger cars per 1,000 people. Thus, the hypothesis that the impact of road transport connectivity on the economic growth of Russian regions is due to the spatial location of the regions can be considered partially confirmed.

The theoretical significance of the study consists in the substantiation of the dependence of the economic growth of each constituent entity of Russia on the level of intra-regional transport connectivity not only of its own, but also of other regions (in the period 2014–2022). The practical significance lies in the possibility of using the results by the government authorities of the federal and regional levels in improving the policy in the sphere of socio-economic and spatial development of territories.

However, realizing that the results of the conducted research do not provide a comprehensive and complete answer regarding the established in Russia patterns of influence of transport connectivity on economic growth, it is necessary to highlight the prospects for further work:

– assessment of the impact of road transport connectivity on economic growth taking into account the different sensitivity of each region to the impact of other regions of the Russian Federation, i.e. taking into account the assumption of the non-constancy of the spatial coefficients rho and theta;

– construction of spatial regression models of GRP dependence on indicators of motor transport connectivity for different groups of regions according to their attribution to the HH, HL, LH, LL Moran's clusters;

– modeling the impact on the economic growth of the constituent entities of the Russian Federation of railway, water, aviation and, in general, integrated transport connectivity (for all modes of transport), taking into account the gaps in statistical data;

– analysis of the problems that can offset the positive impact of road transport connectivity on the economic growth of Russian regions: inconsistency of planned guidelines for transport and economic development, weak involvement of transport infrastructure in the economic processes of the region, etc. (Roslyakova, 2021).

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Spatial Aspects in the Development of the Small Business Sector in the Region

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Abstract. Using the example of the small business sector, the paper analyzes the specifics of an emerging system for managing the spatial development of the economy in one of the regions of the Russian Federation. This aspect is currently regulated by a whole range of documents at the federal and regional levels, and its features include fragmentation, both vertically and horizontally. Currently, only separate blocks of spatial management processes are identified, which are partially interconnected. The described tasks are regulated by various documents: laws of constituent entities of the Federation, target programs, strategies and concepts for spatial or agglomeration development. The federal level has the Spatial Development Strategy of the Russian Federation for the period up to 2030 with a forecast up to 2036, which takes into account negative reviews of the previous document. The regional level has no unified approach to the development and implementation of spatial development documents as well. In order to substantiate the possibilities for improving strategic management in the spatial development of regions,

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we solved the following tasks: updating the approach to the consideration of the regional economic space; substantiating individual structural elements of the regional economic space – agglomerations and subregions – as objects of management; substantiating the possibilities of a strategic approach to managing the spatial development of the region's economy; analyzing best practices of sub-regional management in the regions; and substantiating practical recommendations to authorities on improving the regional management system at the sub-regional level.

Key words: economic space of the region, spatial potential, spatial development, regional development, small business.

Introduction

Currently, spatial regulation is an important component of economic policy at the federal and regional levels; this is emphasized by the Spatial Development Strategy of the Russian Federation for the period up to 2030 with a forecast up to 2036, designed taking into consideration some of the negative comments regarding the previous document. Important features of the spatial paradigm, which can be called a leitmotif of spatial development, were named by A.G. Granberg, who noted that "the Russian economy is not a mono-object, but a multiregional organism functioning on the basis of vertical (center – regions) and horizontal (interregional) economic interactions and is part of the system of global economic relations" (Granberg, 2006). In the framework of this approach, the key task of scientific studies and public policy is to combine regional diversity, integrity of national space and its integration into a globalizing world. A.G. Granberg points out: "In other words, Russia's path in the 21st century is the inevitable search for sustainable integrity in regional diversity with the increasing and unequal impact of globalization processes on different parts of the national space"[1].

At the same time, we note the multidimensional nature of the task of spatial development. On the one hand, it is necessary to maintain the stable integrity and effective functioning of the single economic space (Bondareva, 2021; Urunov, Morozova, 2024). On the other hand, it is necessary to maintain balance amid the contradictions between the need to support growth poles in conditions of natural polarization of development and promote self-development of underdeveloped and depressed economic spaces, as emphasized by P.A. Minakir, founder of the first Russian specialized journal Prostranstvennaya ekonomika (Minakir, 2019).

Taking into account current challenges related to achieving technological sovereignty and ensuring socio-economic development sustainability, the issues of effective use of regional potential are coming to the fore. The spatial paradigm urges us to discuss the expediency of managing the development of the economic space, especially taking into account its fractality and the possibility of "fine-tuning" the regional management system – considering the meso-economic (sub-regional), municipal and local structural levels.

In the context of analyzing modern socio-economic challenges, it is of particular importance to study the impact of small enterprises, which are widespread, on spatial and territorial development. This economic sector, with its flexibility, adaptability and ability to generate innovations, can play an important part in diversifying the economy, creating new jobs and improving living standards. It also has a significant impact on the formation of spatial structure. Unlocking the spatial potential

[1] Granberg A.G. (2003). *Osnovy regional'noi ekonomiki: uchebnik dlya vuzov. 3-e izd.* [Fundamentals of Regional Economics: Textbook for Universities. 3rd ed.]. Moscow: Higher School of Economics. P. 17.

of small business at various levels of the economic space in economic, social and innovative aspects (Bessonov, Koroleva, 2023) can act as a tool for the development and recovery of the economy.

Thus, consideration of the socio-economic development of Russia requires taking into account the possibilities and development of spatial management mechanisms, including at the regional level. The aim of our work is to substantiate approaches and methods of strategic management of economic space development at the regional level using the example of the small business sector. The main research area is the spatial aspect of regional socio-economic development. The following tasks bridge existing gaps in scientific knowledge and are of research interest: updating the modern approach to the consideration of the regional economic space, associated with increased attention to intraregional development, theoretical substantiation of individual structural elements of the regional economic space – agglomerations and subregions – as potential management objects, substantiation of the possibilities of a strategic approach to managing the spatial development of the region's economy, analysis of best practices of sub-regional management in Russia's regions and substantiation of practical recommendations to authorities on improving the regional management system at the sub-regional level. Scientific novelty of the study consists in substantiating and testing a methodological approach to the spatial development of regional small entrepreneurship and identifying areas for improving socio-economic policy. The results obtained can be applied in strategic documents at the federal and regional levels.

Literature review

Approaches to the description of economic space as the basis of spatial development, which is understood as the development taking into account unevenness, heterogeneity, the allocation of poles of growth and periphery, can be revealed in four established concepts: information (the main factors are telecommunication networks, information dissemination, researchers – R. Schuler (Schuler, 1992), R. Capello (Capello, 1994; Capello, 2002), H. Shibusawa (Shibusawa, 1999; Shibusawa, 2000)), process (complex economic process based on network interaction of agents, O.A. Biyakov (Biyakov, 2004)), resource (resource bases, opposition of centrifugal and centripetal motion, P. Krugman (Fujita et al., 1999)), territorial (territory and objects located on it, A.G. Granberg (Granberg, 2006)). Modern interpretations of economic space often combine different approaches. P.A. Minakir and A.N. Demyanenko combine territorial understanding (borders, natural zones) with economic interaction, considering space as a source of resources, an environment for living and for the development of markets (Minakir, Demyanenko, 2014). A.A. Urunov represents economic space as territory, geotory, aquatory and aerotory (Urunov, 2014).

The growth pole theory postulated by F. Perroux (1955) is one of the fundamental theoretical constructs in regional economics and spatial development. The scientist defined the growth pole as "a set of industries united by industrial ties and a dominant industry with the ability to generate economic growth and spread it to the surrounding area". The concept of "polarization" also plays an important role, meaning the concentration of resources and activities at the growth poles and their outflow from peripheral territories. Other representatives of the French school of regional economics also contributed to the development of the growth pole theory. J. Boudeville (1966) focused on the geographical aspect of growth poles, considering them as territorial units with a high concentration of economic activity and influencing the surrounding areas. A. Hirschman (1958) in his unbalanced growth theory emphasized the need to concentrate resources in priority sectors and regions to stimulate economic development.

In Russian science, the growth pole theory has become widespread and has been adapted to Russian conditions. Russian scientists T.E. Kuznetsova and L.V. Nikiforov were among the first to substantiate the need to use a spatial approach (Kuznetsova, Nikiforov, 2013). V.N. Leksin, analyzing the processes of regional development in Russia, emphasizes the need to form supporting centers of innovation activity that can become locomotives of economic growth (Leksin, 2024). He notes that in Russia, with its vast territory and uneven distribution of resources, the formation of such centers is a key factor in ensuring sustainable development. O.S. Pchelintsev (Pchelintsev, 2006), exploring the problems of the regional economy, focuses on the need to develop "growth points" with innovative potential and capable of generating new knowledge and technology. N.V. Zubarevich, analyzing the socio-economic development of Russian regions, notes that the formation of growth poles is an important factor in increasing the competitiveness of the Russian economy; and that it is necessary to take into account the specifics of each region and design strategies based on the use of competitive advantages (Zubarevich, 2022). V.V. Klimanov, analyzing intergovernmental fiscal relations, says that the formation of growth poles requires improving the system of financial equalization of the regions. He emphasizes that it is necessary to create incentives for regions generating economic growth and provide support to lagging regions (Klimanov, Kazakova, 2022).

In modern conditions, the growth pole theory is acquiring new interpretations, shifting the emphasis from the sectoral to the territorial aspect and on the development of urban agglomerations as centers of innovation and economic growth. S.A. Kozhevnikov, summing up the results of modern spatial and territorial development in the European North of Russia (Kozhevnikov, 2019), noted the importance of linear-nodal multidimensional spatial organization with taking into account the allocation of large and small cities and villages, which in fact once again underlines the relevance of the concept under consideration in modern scientific research.

Research methodology

The concept of economic space presupposes a variety of approaches to defining its essence; therefore, spatial development (development of economic space) can also be considered in many aspects. A.V. Suvorova distinguishes synonymous concepts by defining the following hierarchy: territorial development (a complex set of changes in the economy of a territory) – spatial development (change in the spatial structure of a territory) – development of the territory (changing the boundaries of the territory and the development of new locations) (Suvorova, 2019). We consider it appropriate to rely on the opinion of this author on the synonymy of the terms "economic space" and "economic environment", since in this context it is easier to comprehend in scientific and practical terms the diverse approaches to the interpretation of this concept. Thus, economic environment surrounds economic objects, interacting with them (creating conditions and being influenced), and can be considered in the paradigms of information, process, resource, and territorial approaches.

The strategy for the development of small and medium entrepreneurship in the Russian Federation for the period up to 2030[2] identifies mass and high-tech sectors of activity. At the same time, the concretization of technological economic activities has not been carried out unambiguously. To fulfill the task of developing an indicator that includes small enterprises of progressive types of activity, the data from the methods of calculating the indicators "Share of high-tech and knowledge-intensive industries in the gross domestic product"[3] were

[2] Strategy for the development of small and medium entrepreneurship in the Russian Federation for the period up to 2030. Available at: http://static.government.ru/media/files/jFDd9wbAbApxgEiHNaXHveytq7hfPO96.pdf (accessed: March 25, 2024).

[3] On approving the methodology for calculating the indicators "Share of high-tech and knowledge-intensive industries in the gross domestic product": Rosstat Order 832, dated December 15, 2017. Available at: https://docs.cntd.ru/document/556157980 (accessed: April 15, 2024).

used. We used the "List of high-tech, medium-high-tech, and knowledge-intensive industries related to the regional level of the economy" to calculate the indicator "Share of high-tech and knowledge-intensive industries in the gross regional product" (Appendix 2 to this methodology).

Progress of the work

Historically, regional policy in Soviet Russia implied an equalizing approach to the regions and included the existence of a system of alignment and did not consider region-centered interests. Directive planning and centralized distribution were the basis of the command and administrative economy. In the modern economic system, the ratio of federalism and regionalism determines the balance between centralization of power and centrifugal forces. The region is considered by modern scientists in many ways autonomously within the framework of the concepts of quasi-state, society, corporation and market. Each of them presupposes the adoption of independent decisions based on the characteristics of the system of potentials of the regional economy and the self-determination of the regional community. Nevertheless, the single economic space of Russia, which defines fundamental principles and strategies of national development, appears to be a more significant paradigm. Based on the fractality inherent in the economic space as a whole (the principle of including smaller similar parts like a matryoshka doll), it is possible to give the following definition.

Regional economic space acts as part of a larger national economic space and represents a heterogeneously developing economic environment with signs of coherence and unity of institutions and specialization formed on the basis of common development, including a number of spatial structures – agglomerations, subregions, non-agglomeration spaces and centers of economic growth. Regional economic space, in turn, fractally includes sub-regional, municipal and local structural levels, each of which can be the subject of a separate study.

According to the Spatial Development Strategy of the Russian Federation until 2025, an important problem is the low level of socio-economic cooperation at both the interregional and inter-municipal levels (Bukhvald, Valentik, 2024; Ivanov, Buchwald, 2024). The issue of allocating elements of the intraregional economic space for appropriate stimulation of interaction is debatable. For example, A.G. Ataeva and A.G. Ulyaeva, based on the analysis of socio-economic development strategies of the subjects of the Volga Federal District, identify the following subjects of inter-municipal interaction: municipalities, clusters, urban agglomerations, territories of advanced socio-economic development (Ataeva, Ulyaeva, 2023, pp. 180–181).

Agglomerations in the Spatial Development Strategy of the Russian Federation until 2025[4] are presented as the most progressive part of the economic space ("Transformation of the spatial organization of the economy" section), which contains the majority of the main elements of the region's innovation potential and is based on developed logistics infrastructure systems. Historically, the development of urban settlements and urbanized territories has brought a synergistic effect to the formation of civilizational progress. Russia's agglomeration network includes more than 40 large and major urban agglomerations, about half of which are connected to economic growth centers that provide a significant contribution to GDP.

The subregions represent a less saturated economic space, united by a common historical formation and close inter-municipal ties based on economic and geographical location and similar specialization. The theory of sub-regional development is in the process of formation and has not been widely disseminated in modern scientific literature and strategic documents. The approach

[4] Spatial Development Strategy of the Russian Federation until 2025. Available at: http://static.government.ru/media/files/UVAlqUtT08o60 RktoOXl22JjAe7irNxc.pdf (accessed: October 5, 2024).

proposed in the Strategy for Socio-Economic Development of the Samara Region[5] includes the description of the subregion as semi-peripheral, partially overlapping with the agglomeration territory, or completely peripheral part of the region, formed due to inter-municipal cluster connections.

To assess the heterogeneity of the Samara Region's economic space and illustrate the most progressive development within the Samara-Tolyatti agglomeration, we will analyze the development of the small business sector at the sub-regional economic level *(Tab. 1)*. Small enterprises are of scientific interest due to their inherent ability to effectively carry out innovative search and promptly respond to changing market conditions, as well as because of the possibility to promote the development of the region's economic space by implementing the spatial potential of small enterprises.

The Samara-Tolyatti agglomeration represents the most populated part of the region and contains 83% of its population. As a result, there is a significant asymmetry in the spatial distribution of small enterprises (91% of the regional total), including progressive types of activity (96% of the regional level). Thus, the agglomeration creates more favorable conditions for the development of high-tech and knowledge-intensive small enterprises. In our study we consider the composition of the Samara-Tolyatti agglomeration taking into account the municipalities that are fully part of it: urban okrugs of Samara, Tolyatti, Syzran, Novokuibyshevsk, Kinel, Chapaevsk, Zhigulevsk, Oktyabrsk; Volzhsky, Kinelsky, Krasnoyarsky, Stavropolsky municipal districts.

The highest density of small enterprises (446.28 units per 10,000 people) was recorded in the Samara-Tolyatti agglomeration, while the rest of the subregions lag far behind. Thus, the Southern subregion ranks second with a value of 1.7 times less (260.69). Pokhvistnevsky subregion has the lowest value (175.01).

The density of small high-tech and knowledge-intensive enterprises also differs depending on the nature of the economic space: the highest index is 60.09 within the boundaries of the Samara-Tolyatti

Table 1. Analysis of the spatial development of small enterprises (legal entities and individual entrepreneurs) in the Samara Region at the sub-regional level, 2023

Subregion	Population, 2023	Number of small enterprises, 2023		Number of small enterprises of progressive types of activity, 2023	
		Total, units	Per 10,000 people	Total, units	Per 10,000 people
Samara-Tolyatti agglomeration	2600626	116062	446.28	15626	60.09
South-Western	74146	1552	209.32	100	13.49
Syzransky	227342	5387	236.96	476	20.94
Otradnensky	110247	2435	220.87	181	16.42
Neftegorsky	55777	1114	199.72	54	9.68
Pokhvistnevsky	78622	1376	175.01	74	9.41
Sergievsky	114199	2193	192.03	123	10.77
Southern	65980	1720	260.69	79	11.97

Calculation sources: Unified register of small and medium enterprises. Available at: https://ofd.nalog.ru (accessed: April 10, 2024), Permanent population of urban okrugs and municipal districts of the region. Samara Statistical Yearbook. Available at: https://63.rosstat.gov.ru/folder/34255 (accessed: April 10, 2024). The number of population is given as of January 1, and the number of small enterprises as of January 10.
Urban okrugs Syzran and Oktyabrsk were included both in the Samara-Tolyatti agglomeration and Syzransky subregion in accordance with the Strategy for Socio-Economic Development of the Samara Region until 2030.

[5] Strategy for Socio-Economic Development of the Samara Region until 2030. Available at: https://economy.samregion.ru/upload/iblock/82a/ strategiya-so_2030.pdf (accessed: October 15, 2024).

agglomeration, among other subregions it varies from 20.94 (Syzran), which is 2.87 times less than the agglomeration, to 9.41 (Pokhvistnevsky). Thus, the Samara-Tolyatti agglomeration is sharply distinguished by its high density of small enterprises, while the imbalance in the density of high-tech and knowledge-intensive small enterprises is more pronounced.

Another important aspect of development is the level of investment activity. Due to the limited information resources, data from the continuous statistical monitoring of small and midsize business for 2020 were used[6] *(Tab. 2)*.

In absolute terms of the volume of attracted investments, the Samara-Tolyatti agglomeration is undoubtedly the leader (53,055 million rubles, which is more than 86% of the total investment in small enterprises in the region), noticeably ahead of the subregions (figures range from 993.9 million in Neftegorsky subregion to 2 082.7 million in the Southern subregion). The relative volume of investments per 1 small enterprise is most important in the Southern subregion (1833.34 thousand rubles), the least in Syzransky subregion (417.03 thousand rubles). At the same time, the Samara-Tolyatti agglomeration does not occupy a leading position with an indicator of 791.92 thousand rubles.

To confirm the hypothesis of a decrease in the share of investments by small enterprises as we move away from the center of the region, let us turn to the cartogram of investments in small enterprises from the regional volume in the municipal context *(Figure)*.

It shows that the largest share of investments falls on the central part of the Samara Region, followed by a lower percentage in the surrounding areas, and municipalities with the lowest shares are represented as they move away from the center. However, the location of the most developed municipalities does not fully coincide with the agglomeration zone, showing, for example, a high level of investment in Krasnoarmeysky and Pestravsky districts south of Samara.

The results obtained prove the heterogeneity of the spatial development of the small business sector and the presence of significant potential, which reinforces the need to develop approaches and

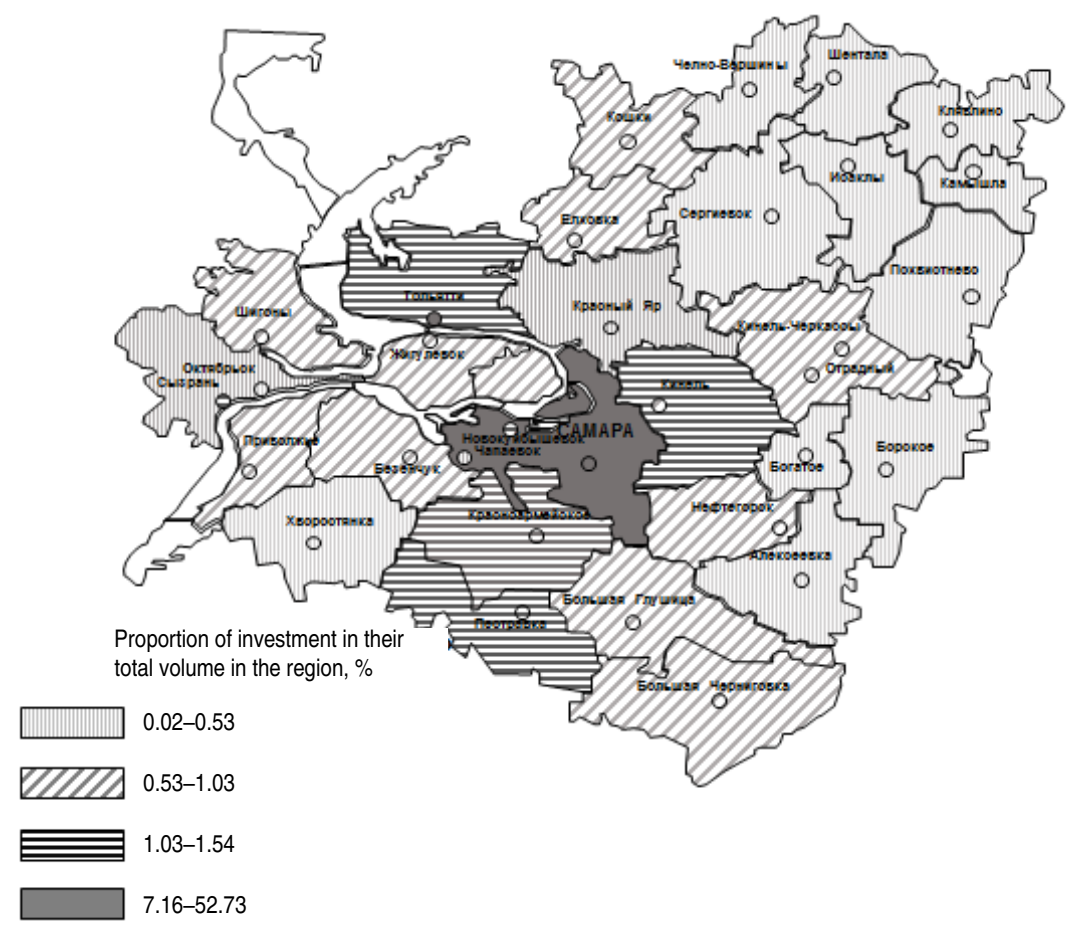
Table 2. Investments in small enterprises of the Samara Region at the sub-regional level in 2020 (individual entrepreneurs and legal entities)

Subregion	Number of small enterprises, units	Investment, thousand rub.	Share of investments in the total volume in the region, %	Investments per small enterprise on average, thousand rub.
Samara-Tolyatti agglomeration	66995	53 055 058	86.20	791.92
South-Western subregion	1033	1004 365	1.63	972.28
Syzransky subregion	3518	1467 113	2.38	417.03
Otradnensky subregion	1516	1 149 596	1.87	758.31
Neftegorsky subregion	896	993 871	1.61	1109.23
Pokhvistnevsky subregion	1119	457 225	0.74	408.60
Sergievsky subregion	1520	1 336 281	2.17	879.13
Southern subregion	1136	2 082 678	3.38	1833.34

Calculated according to: Investments in fixed assets in terms of new fixed assets, as well as those acquired by import in 2020 by type of set: small enterprises (including microenterprises) (legal entities); Availability of investments in fixed assets in individual entrepreneurs in 2020: individual entrepreneurs (small, including micro). Results of the continuous monitoring of small and midsize business for 2020. Available at: https://63.rosstat.gov.ru/folder/148376 (accessed: April 15, 2024).

[6] Results of the continuous statistical monitoring of small and midsize business for 2020. Available at: https://63.rosstat.gov.ru/folder/148376 (accessed: April 15, 2024).

Spatial differentiation of small enterprises of the Samara Region (individual entrepreneurs and legal entities) by share of investments in 2020



Calculated according to: Investments in fixed assets in terms of new fixed assets, as well as those acquired by import in 2020 by type of set: small enterprises (including microenterprises) (legal entities); Availability of investments in fixed assets in individual entrepreneurs in 2020: individual entrepreneurs (small, including micro). Results of the continuous monitoring of small and midsize business for 2020. Available at: https://63.rosstat.gov.ru/folder/148376 (accessed: April 15, 2024).

tools for effective management of spatial economic development at the sub-regional level. By this concept, we mean a system of targeted influence on the actors of the regional economy at the sub-regional level, which makes it possible to achieve effective socio-economic development by implementing spatial potential through strengthening inter-municipal ties and improving spatial and territorial location.

However, in Russia, only federal, regional, and municipal levels of public authority are legally distinguished. Nevertheless, analyzing the possible structuring of the economic space, the macro-regional and sub-regional levels mentioned in the strategic documents were previously identified, which currently do not correspond to the governing bodies (Bessonov, Koroleva, 2023, p. 25). There are also alternative points of view that offer greater

variability in the choice of economic space units (Structuring ..., 2016). In the system of strategic documents, the macro-regional and sub-regional levels are also mostly indicated by a dotted line (as a rule, as part of a regional or federal strategic document).

According to some authors, it is relevant to study approaches to the strategic regulation of spatial development using the example of agglomeration, as well as to review how relevant opportunities are reflected in the system of regulatory documents. Thus, N.K. Saveleva and co-authors consider consolidation and elaboration of the status and regulation of the functioning of agglomerations, as well as management and consolidation of powers (Saveleva et al., 2023). The researchers identify only a few Russian agglomerations (these include the Samara-Tolyatti, Saratov and Chelyabinsk agglomerations), for which the redistribution of powers of the regional and municipal levels of government is fixed, and the status of the agglomeration is determined. In most cases, the creation and functioning of an agglomeration is reflected in a regional socio-economic development strategy *(Tab. 3)*; however, in some cases, a regional law, concept or strategy for the development of an agglomeration acts as a regulatory document. Thus, strategizing is one of the main methods of managing an economic space (using the example of agglomeration).

The development of the subregions has been described in a smaller list of strategic documents *(Tab. 4)*. Their analysis gives an idea of the declared and applied approaches to subregions management.

At the regional level of the Samara Region, the following management approaches to the subregions are proposed: infrastructure development (telecommunications, road transport network, social infrastructure); integrated approach to environmental protection and waste recycling; implementation of the tourist and recreational potential of localities; improvement of the settlement system: promoting

Table 3. Legal acts and other territorial development planning documents regulating the status of agglomerations in various constituent entities of the Russian Federation

Document regulating the creation and functioning of an agglomeration	Agglomeration
Law of RF constituent entity	Belgorod, Tomsk, Kemerovo, Rostov
Strategy for socio-economic development of the region	Chelyabinsk, Udmurt, Omsk, Krasnodar, Krasnoyarsk, Khanty-Mansiysk, Ulyanovsk, Novosibirsk
Agglomeration development strategy	Izhevsk
Agglomeration development concept	Tomsk, Surgut, Krasnoyarsk, Irkutsk, Nizhnevartovsk, Samara-Tolyatti
Source: (Saveleva et al, 2023).	

Table 4. Legal acts and other territorial development planning documents regulating the status of subregions in various constituent entities of the Russian Federation

Document regulating the creation and functioning of a subregion	Region	Defining principle
Strategy for socio-economic development of the region	Samara Region	Division of the entire territory of the region into seven subregions and the Samara-Tolyatti agglomeration, partially overlapping their territory
	Republic of Bashkortostan	Allocation of two subregions and two agglomerations on the territory of the republic – Ufa and South Bashkir; part of the territory is not classified
	Krasnodar Territory	Representation of the region's territory as a set of seven administrative okrugs, including the Krasnodar and Sochi agglomerations
Law of RF constituent entity	Sverdlovsk Region	Division of the entire territory of the region into five administrative okrugs
Source: own elaboration.		

job creation and increasing budget provision in sparsely populated areas of the region; attracting investments for formed projects. In the Republic of Bashkortostan, it is proposed, within the framework of strategic inter-municipal cooperation, to develop and implement comprehensive targeted programs relevant to each municipality of the subregion.

Formalizing the acquired knowledge makes it possible to formulate the following conclusions.

First, the division into natural (formed as clusters) and artificial (formed within the framework of managerial authority) subregions on the territory of Bashkortostan makes it possible to speak about their corresponding to the administrative okrugs (Sverdlovsk Region) and economic okrugs (Krasnodar Territory) allocated at the sub-regional level.

Second, agglomerations are included in the subregion (administrative, economic okrug) in whole or in part (as in the Samara Region), despite the differences in their socio-economic essence.

Third, there are no claims for administrative-territorial allocation through municipal reform, in contrast, for example, to the experience of Ukraine, which significantly enlarged the intraregional administrative-territorial division based on the unification of municipal districts during the reform in 2020.

Fourth, the presence of administrative bodies in some cases (Sverdlovsk Region): for example, the management body of an administrative okrug appears as a territorial intersectoral executive authority under the leadership of a manager acting on the principles of unity of command.

Taking into account the above, let us present the main spatial directions for regulating the development of the small business sector, defined in the documents of the Samara Region *(Tab. 5)*.

The urgent tasks include combating unemployment and alleviating social tension by creating new jobs; diversification of the economy, in single-industry cities as well; development of public-private partnership mechanisms; cooperation between small and large enterprises; and increasing tax revenues.

The Strategy for Socio-Economic Development of the Samara Region until 2030 highlights the sectoral and cluster directions. The document reflects the idea of geographically differentiated stimulation of priority types of entrepreneurship at the municipal level, which is provided for in the "Improving the effectiveness of interaction with local governments" section. Promoting the cooperation between small and large businesses has been approved as a priority area. At the same time, it is emphasized that a system of support for the development of small and midsize businesses has already been formed in the region, and further fine-tuning is required: it is necessary to introduce new tools and to improve existing ones, including for the formation of the spatial aspect of management.

Only certain municipal strategies for socio-economic development of the Samara Region mention the spatial development of small

Table 5. Directions and content of spatial development regulation for small enterprises of the Samara Region in regional documents

Document	Regulation direction	Content
Strategy for Socio-Economic Development of the Samara Region	Sectoral	Promoting the development of priority activities in individual municipalities
	Cluster	Implementing the spatial potential of small enterprises, interaction with large enterprises, cross-border cooperation
Strategy for Socio-Economic Development of Municipalities of the Samara Region	Project	Investment projects
	Infrastructure	Creating technology parks, business incubators and other infrastructure elements
Source: own elaboration.		

enterprises. We have identified a project area that provides for the implementation of investment projects with specific localization, and an infrastructure area that reinforces the need to create an infrastructure for spatial development, technology parks and business incubators, as well as promote cluster cooperation.

We consider it logical to highlight regional experience of a differentiated approach to municipal development based on the foresight method (Koroleva, Evdokimov, 2012). The methodology for designing socio-economic strategies implemented in the region includes field foresight sessions in which scientists, together with stakeholders from the local community (district leaders, entrepreneurs, local residents and other interested parties), determine promising areas of socio-economic development. Based on this approach, an appendix was developed that includes a scenario for unlocking the spatial potential of small enterprises by designing missions and goals for the development of small enterprises in the subregion (Bessonov, Koroleva, 2024). One of the stages is to take into account local competitive advantages and traditions (including those associated with the need to promote the uniqueness, identity and traditions of the local territory), which, together with the rejection of directive planning of specialization "from above", is consistent with the principles of "smart specialization" – the paradigm of innovative development of the European Union (Ranga, 2018).

To improve the system of spatial management of the regional development of the small enterprises sector based on the analysis of documents and taking into account the regional experience of differentiated development of small enterprises at the municipal level, we put forward the following provisions. Due to the fact that there is currently virtually no sub-regional management system for territorial development in the Samara Region, it is also advisable to use benchmarking – the application of best practices coupled with a logical substantiation of application possibilities.

1. Endowing the existing sub-regional structure of the region (7 subregions and the Samara-Tolyatti agglomeration) with administrative powers to manage regional development. Distributing the powers between regional and municipal authorities to manage agglomeration and sub-regional development.

Creating administrations with coordination and control functions over the leadership of municipalities, under the leadership of a chairperson, who is part of the Samara Region Government. Highlighting the development of small enterprises as a separate area of activity.

2. Ensuring the development of a single regional economic space (institutional support, infrastructure, access to resources), taking into account the significant heterogeneity in the spatial development of small enterprises in the region (contrasting the Samara-Tolyatti agglomeration with the rest of the Samara Region).

3. Implementing a coordinated policy for the development of small enterprises at the sub-regional level. Consolidating municipal public business organizations to the sub-regional level. Designing a mission, goals and promising specializations based on the foresight method, taking into account the opinions of the local population, entrepreneurs, and representatives of the administration. Promoting the implementation of the spatial potential of small enterprises based on inter-municipal cooperation and the "smart specialization" of the subregion.

The above conclusions can be included in the documents of the strategic planning system at the federal and regional levels: in the emerging new Spatial Development Strategy of the Russian Federation, regional strategies for socio-economic development; they can also be included in regional laws on improving the administrative and territorial structure.

Discussion

The research revealed a number of trends and patterns. However, we acknowledge that the work has its limitations, which should be taken into account when interpreting the results obtained and formulating practical recommendations. One of them is the relatively small amount of factual data on the sector of small enterprises in the region (Samara Region), their structure and dynamics. This makes it difficult to form a comprehensive understanding of the role of this economic segment in spatial development and limits the possibilities for deeper analysis. In addition, insufficient attention has been paid to the analysis of strategic documents in the regions, which does not allow us to draw unambiguous conclusions about the management structure of sub-regional development and assess the effectiveness of existing regional policy instruments. To overcome these limitations, further research needs to expand the analyzed database so as to include more detailed information on the activities of small enterprises in various economic sectors, as well as deepen the analysis of regional strategies, paying attention to the mechanisms of their implementation and performance assessment.

An important methodological limitation consists in the insufficient assessment of the role of large and midsize businesses in the structural development of the region. As many researchers rightly point out (Sapozhnikova, 2017; Malyshev, 2020), the structural development of a region is determined not so much by small business as by large and midsize enterprises, which in many ways determine the volume and structure of small businesses. Therefore, a more complete and objective analysis requires taking into account the interrelationships and interdependencies between different sectors of the region's economy, as well as analyzing their cumulative impact on spatial development. Ignoring this aspect can lead to distortion of the real picture and incorrect conclusions.

A significant drawback of the study is the lack of a methodologically substantiated transition from assessments of the unevenness of spatial development to assessments of the potential for territorial development. Simply stating the fact of unevenness is not enough to design an effective strategy for sub-regional development. It is necessary to work out and propose an approach to assessing the development potential of various territories, taking into account their resource potential, geographical location, infrastructural security and other factors. An approach combining SWOT analysis methods and geoinformation systems for visualization and analysis of spatial data can be used as a promising direction.

Finally, proposals to create structures responsible for sub-regional development under the region's government bodies require more specific study and substantiation. It is necessary to clearly show how these structures will differ from the numerous existing coordination and sectoral structures, what prevents the creation of such structures today, and what specific content their activities should be filled with. It is necessary to rely on best practices of regional management and take into account the specifics of a particular region and its institutional environment.

Thus, further research should be directed toward overcoming these limitations and improving the methodological framework. Special attention should be paid to expanding the evidence base, taking into account the role of large and medium businesses, developing methods for assessing the potential for territorial development and specifying proposals for improving the management system for sub-regional development. This will allow obtaining more reliable results and formulate more effective recommendations for regional policy.

Conclusion

Studying the essence and features of the development of the regional economic space allows substantiating possible management tools. Despite

the existing variety of approaches, it is possible to consider economic space in a practice-oriented manner as a heterogeneous, but at the same time unified economic environment with a common specialization and functioning on the basis of inter-municipal cooperation, influencing the socio-economic development of the entire region and being influenced by it as well.

The strategic documents define agglomerations and subregions formed by inter-municipal cooperation of various levels of intensity as the main units of the economic space. The analysis of sub-regional development using the example of the small business sector, the part of the economy that responds most quickly to changes in market conditions, confirms the internal heterogeneity and the potential for further implementation by changing the spatial and territorial configuration and strengthening inter-municipal cooperation. The scientific novelty of the research lies in designing a new methodological approach for managing the spatial development of small business in the region. This approach helps to identify priority areas of development on the ground and create more effective state support tools. The results of the study, namely the proposed directions for improving socio-economic policy, are of practical importance and can be used to design strategies and development programs both at the regional and national levels, increasing the effectiveness of regional development management.

Due to the lack of a well-established sub-regional management level, practical recommendations for managing the economic space at the sub-regional level are based on best practices that are fragmentary in individual regions. We consider the phrases "administrative okrug" and "economic okrug" to be synonymous. In our opinion, full intraregional division into subregions and agglomerations is advisable, while legislative consolidation of administrative functions is required for the relevant governing body, which has at least coordinating and controlling functions. The formed management framework will make it possible to specify measures and methods of development in the process of "fine-tuning" the regional management system, focusing them on specific municipalities and subregions. At the same time, it is advisable to rely on extensive regional experience, such as the use of the method of regional foresight and "smart specialization" of the subregion.

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The Impact of the Agglomeration Factor on the Development of Municipal Entities in the Novosibirsk Region

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Abstract. The paper considers municipal entities of the Novosibirsk Region in terms of the concentration of population and other resources in the metropolitan area. The aim of the research is to study the influence of population concentration in the Novosibirsk agglomeration on the development of the region's municipalities and the dynamics of the region's economy as a whole. The information base includes data from Rosstat and its Novosibirsk territorial division. The research period covers the time interval from 2005 to 2022. We propose an approach that allocates three territorial sectors of the economy, one of which is the Novosibirsk agglomeration, the other two include successfully developing and depressed municipalities, depending on the dynamics of their indicators. The resulting sectors are adjusted based on the location of municipal entities. Peripheral municipalities, being under the influence of the Novosibirsk agglomeration, are characterized by significant population migration, but economic indicators are growing faster in successfully developing municipalities compared to the Novosibirsk agglomeration. Using the Cobb – Douglas production functions constructed for three sectors we assess the impact of an increase or decrease in migration to the Novosibirsk agglomeration from other sectors. The results obtained make it possible to put forward some guidelines that will allow individual peripheral territories to develop successfully, primarily by creating favorable living conditions for the population. The study is part of a research project to assess the impact of the formation and development of agglomerations on the economy of the region as a whole. The results obtained can be used in regional strategic and program documents.

Key words: agglomerations, periphery, municipal entities, production functions, population migration, territorial development.

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Introduction

A significant amount of research is devoted to the spatial development of regions in conditions of concentration of resources in their centers, and various models have been built to study the ongoing processes (Harris, 1954; Ellison, Glaser, 1997; Krugman, Venabies, 1997; Holmes, Stevens, 2002; Romer, 1992). Many works have shown that there are considerable economic benefits from the concentration of economic activity and the formation of agglomerations (Kolomak, 2018; Kolomak, Sherubneva, 2023; Pavlov, Khmeleva, 2023; Olifir, 2024). It is noted that agglomerations are characterized by a more progressive economic structure and higher indicators of economic development, such as the level of production development, factor productivity, average monthly wages, and others (Zubarevich, 2006; Kolomak, 2013; Ago et al., 2018). Knowledge-intensive industries are concentrated in the agglomeration, with more diverse clusters located in its core and highly specialized ones on its periphery (Chica, 2016; Inkinen, Kaakinen, 2016).

Agglomerations have an impact on the development of surrounding territories, and the largest of them influence not only their own region, but also neighboring territories (Lukin, Uskova, 2018). At the same time, studies have demonstrated

that economic benefits and advantages tend to fade as one moves away from the agglomeration center (Fauzer et al., 2021; Rosenthal, Strange, 2004). It was noted that the influence of the agglomeration population on factor productivity in various types of economic and production activities decreases with distance; ebbing of influence usually begins at about a 60 km distance (Lavrinenko et al., 2019; Olifir, 2022; Isaev et al., 2022). There is also a correlation between population density in the agglomeration and economic growth (Chen et al., 2023).

When analyzing the development of European capitals, it was shown that it is necessary to improve second-tier cities and resist investment concentration within capitals, otherwise these resources gradually become less effective (Parkinson et al., 2015). In Russia, given the depopulation, the growth potential of "second cities" is limited; population concentration increases spatial compression, and remote municipalities lose population faster (Mkrtchyan, Karachurina, 2014; Moroshkina, 2023). As a result, agglomeration growth and resource concentration in the capital of the region and its surroundings can lead to periphery degradation (Uskova, 2015). In this regard, the research of the impact of resource concentration in the regional center on the growth of the entire region's economy is relevant.

The Spatial Development Strategy of the Russian Federation for the period up to 2025[1] has identified the processes of agglomeration development as one of the main sources of economic growth. It established the largest and large Russian agglomerations. However, in the Spatial Development Strategy of the Russian Federation for the period up to 2030 with a forecast up to 2036[2], more attention is paid to interregional and intraregional differentiation and the issue of territories that are losing population due to its migration into agglomerations.

The development of the territories surrounding the agglomeration depends on the distance from the agglomeration center and its population (Bufetova, 2011; Bufetova, 2020). The municipalities closest to the regional capital are usually growing, while the more remote ones are depopulating, and this process accelerates with the distance. It should be noted that under certain conditions, municipal entities that are quite far from the agglomeration can also develop successfully. When analyzing the growth of municipalities in the Northwestern Federal District, it was shown that, in addition to those surrounding the regional center, municipalities with transport infrastructure, institutions of secondary and higher vocational education, and often located on the borders of the region, interact with neighboring entities (Druzhinin, 2023). Individual municipalities cooperate with other regions and their enterprises are integrated into large federal structures, which allows them to receive the resources necessary for their growth and implement innovative projects in various types of activities (Kozhevnikov, 2023; Kozhevnikov, Voroshilov, 2024).

Novosibirsk is located in the east of the region. The Novosibirsk Region development analysis showed that although there are slowly developing municipalities to the west of the agglomeration, individual municipalities that are located even further west are developing noticeably faster than Novosibirsk (Kolomak, 2024).

[1] Spatial Development Strategy of the Russian Federation for the period up to 2025. Available at: https://economy.gov.ru/material/directions/regionalnoe_razvitie/strategicheskoe_planirovanie_prostranstvennogo_razvitiya/strategiya_prostranstvennogo_razvitiya_rossiyskoy_federacii_na_period_do_2025_goda/ (accessed: September 12, 2024).

[2] Spatial Development Strategy of the Russian Federation for the period up to 2030 with a forecast up to 2036. Available at: http://government.ru/docs/53917/ (accessed: September 12, 2024).

The scientific challenge is that, at one point, agglomeration development and population concentration put brakes on the regional economy growth due to the periphery degradation, and the impact of agglomeration development on the whole region's economy is poorly understood. Peripheral territories can develop successfully, but more often they can turn out to be left behind places, rapidly losing their population (MacKinnon et al., 2021; Pugh, Dubois, 2021). This largely depends on the availability of infrastructure, but other factors also matter (Glass et al., 2019; Kolomak, 2024).

So, it can be assumed that under certain conditions, developing territories may appear at some distance from the agglomeration, and the support of the authorities is crucial for their more successful development. The growth of agglomerations can lead to desertification of a significant part of the region's territory, and local authorities should encourage the development of municipalities with the necessary potential. Their improvement can increase the quality of life and their gradual growth can create conditions for the progress of the surrounding municipalities.

Accordingly, the aim of the research is to study the influence of population concentration in the Novosibirsk agglomeration on the development of other municipalities in the region, identify successfully developing municipalities and assess the impact of changes in migration from them to the agglomeration.

To achieve this aim, it is necessary to solve a number of tasks that will allow us to obtain new results:

1) development of a methodological approach for analyzing the consequences of resource concentration in an agglomeration;

2) analysis of the dynamics of development indicators of the municipal entities of the Novosibirsk agglomeration and aggregated territorial sectors outside of it;

3) construction of production functions and assessment of the influence of decreasing/increasing migration and employment between sectors on the regional economy dynamics.

Methodology and data

Based on the development analysis results for regions and agglomerations in Russia, an approach has been created to identify territorial sectors depending on the characteristics of the development of territories and their geographical location. The region is divided into an agglomeration and a periphery. The main feature of the approach is to identify three territorial sectors: agglomeration, successfully developing territories and slowly developing (depressed) territories. The methodology was created based on an analysis of the development of various regions with the largest, large agglomerations and small capitals.

Data from Rosstat[3] and Novosibirskstat[4] were used to test the proposed approach. To build aggregated territorial sectors and models, information was obtained for municipalities on the following indicators: shipped own-produced goods, works and services performed on their own (excluding small businesses), including Industry; average number of employees (excluding small businesses); investment in fixed assets (excluding small businesses) and population as of January 1. Data on shipped goods are available only from 2014, which limited the study period. The value indicators of municipalities were recalculated into indices using their proportion in the corresponding regional indicator (investment dynamics and

[3] Regions of Russia. Socio-economic indicators. 2023: Statistical book. Rosstat. Moscow, 2023; Database of municipal indicators. Rosstat. Available at: https://rosstat.gov.ru/dbscripts/munst/munst50/DBInet.cgi#1 (accessed: September 12, 2024).

[4] The main indicators of the socio-economic situation of urban okrugs and municipal districts of the Novosibirsk Region. 2022: Statistical book. The territorial body of the Federal State Statistics Service in the Novosibirsk Region. Novosibirsk, 2023.

industrial production), which had previously been obtained in a comparable form, according to data available in Rosstat books. The problem is the lack of shipped goods indices by region. In this work, the dynamics of gross regional product and the proportions of municipalities in terms of shipped goods were taken, and an approximate estimate of the indices for the three identified territorial sectors was calculated. In addition to long-term investments, approximate fixed assets dynamics were built based on their structure at the end of 2013 and investment dynamics.

In the work, the Novosibirsk agglomeration was determined on the basis of the Novosibirsk Region Government Resolution 105-p, dated March 19, 2019[5]. It included Novosibirsk, Berdsk, Iskitim, Koltsovo, Ob urban okrugs and Iskitimsky, Kolyvansky, Kochenevsky, Moshkovsky, Novosibirsky, Ordynsky and Toguchinsky municipal districts, 12 municipal entities in total. There are also other approaches, for example, in the Order of the Ministry of Economic Development of Russia 669, dated September 26, 2023 (revised May 31, 2024) "On approval of Methodological recommendations for the creation of long-term plans for the socio-economic development of large and the largest urban agglomerations"[6] there are no Iskitimsky, Ordynsky and Toguchinsky municipal entities. The Center for Strategic Research's documents do not include Ordynsky and Toguchinsky municipal districts[7].

The second sector was identified by analyzing the dynamics of population, employment, investment, output and labor productivity of the municipal entities of the region and comparing these indicators with the corresponding indicators of Novosibirsk and the region in general, which allowed selecting more successfully developing municipalities. They have potential for economic growth, and their key indicators (investment, output, and labor productivity) have significantly better dynamics than the region in general. Based on the analysis, nine municipal entities were classified as successfully developing: Barabinsky, Bolotnitsky, Zdvinsky, Kargatsky, Kuibyshevsky, Maslyaninsky, Tatarsky, Chanovsky and Chulymsky districts. Then this list was refined taking into account the geographical location of municipalities, the specifics of their economic development and the availability of transport infrastructure.

The third sector consists of municipalities that are losing human capital and other resources, following a general pattern: the further away from the regional capital, the faster the population and other indicators decrease; these are depressed or slowly developing municipalities.

After aggregating the indicators for the three territorial sectors obtained, graphs were charted, the analysis of which made it possible to verify aggregation validity and check whether there are any dependencies.

As a result, according to regional documents, 12 municipal entities were initially included in the Novosibirsk agglomeration, 9 were classified as developing and 14 as depressed.

In 2018, the Barabinsk-Kuibyshev agglomeration[8] was launched as part of Barabinsky, Kuibyshevsky, Severnyi and Zdvinsky districts in the northwestern part of the region. A Coordinating Council has been formed, but there is still no active work. The heterogeneity of the emerging agglomeration should also be highlighted: along with developed municipalities, it also includes Severnyi District with a low level of economic development.

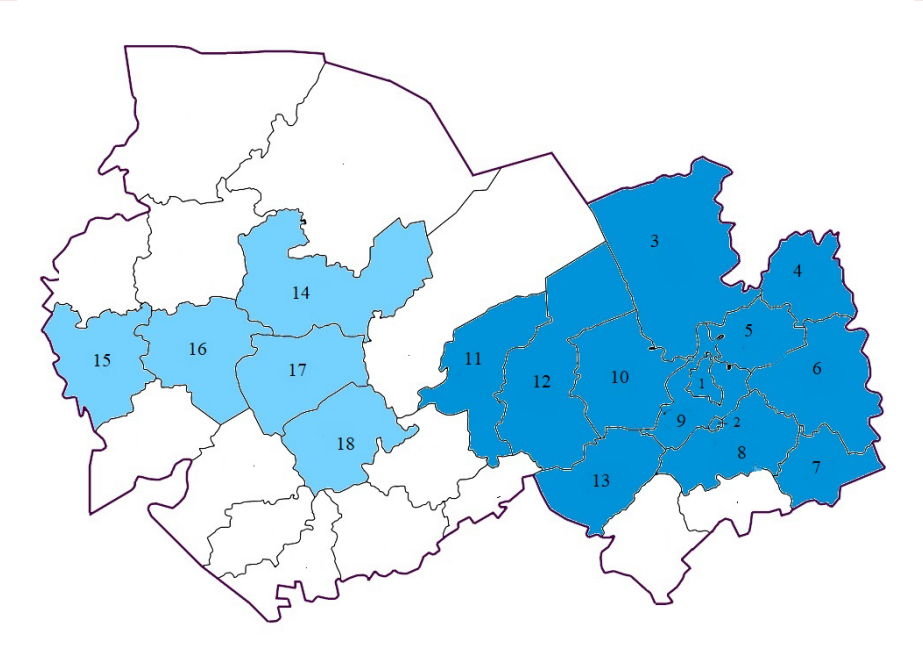
[5] http://publication.pravo.gov.ru/Document/View/5400201903210003?index=381 (accessed: September 12, 2024).

[6] https://legalacts.ru/doc/prikaz-minekonomrazvitija-rossii-ot-26092023-n-669-ob-utverzhdenii/

[7] Karavaeva T. (2021). *Aglomeratsii – tochki rosta v epokhu turbulentnosti* [Agglomerations – Growth Areas in the Era of Turbulence]. Moscow: "CSR" Foundation.

[8] Documents of the Barabinsk-Kuibyshev agglomeration. Available at: https://minstroy.nso.ru/page/4809 (accessed: September 12, 2024).

Figure 1. Municipal entities of the Novosibirsk Region



Colored: blue – expanded Novosibirsk agglomeration (1 – Novosibirsk, 2 – Berdsk, 3 – Kolyvansky Municipal District, 4 – Bolotninsky, 5 – Moshkovsky, 6 – Toguchinsky, 7 – Maslyaninsky, 8 – Iskitimsky, including Iskitim city, 9 – Novosibirsky, including Ob city and Koltsovo industrial township, 10 – Kochenevsky, 11 – Kargatsky, 12 – Chulymsky, 13 – Ordynsky), light blue – expanded Barabinsk-Kuibyshev agglomeration (14 – Kuibyshevsky Municipal District, 15 –Tatarsky, 16 – Chanovsky, 17 – Barabinsky, 18 – Zdvinsky)

The developing municipalities location analysis has shown that two of them (Bolotninsky and Maslyaninsky districts) are close to the east of the Novosibirsk agglomeration, and two (Kargatsky and Chulymsky) are connected with the west of it by the Trans-Siberian railway, and it can be assumed that after some time they will enter the agglomeration. The remaining five are either part of the Barabinsk-Kuibyshev agglomeration or they are adjacent to it. In this case, we can consider another option for aggregating municipalities, which eventually became the main one, including 16 municipalities in the expanded Novosibirsk agglomeration, and five municipalities in the expanded Barabinsk-Kuibyshev agglomeration (later in the article, these five municipalities will be understood as the Barabinsk-Kuibyshev agglomeration). 14 municipalities were classified as depressed in both variants *(Fig. 1)*.

Based on the collected data, graphs were charted and analyzed to identify the dependencies of indicators; production functions were constructed, considering the correlation between the dynamics of shipped goods and the dynamics of employment and long-term investments (or fixed assets):

$$Y_i(t) = A_i \times K_i^{\alpha_i}(t) \times L_i^{\beta_i}(t), \qquad (1)$$

where: $Y(t)$ – shipped goods;

$K(t)$ – long-term investments (or fixed assets);

$L(t)$ – number of employees;

i – sector; t – year; A, α, β – constants.

The standard Excel and Statistica packages were used as tools.

Based on the constructed functions, it was analyzed whether an increase or decrease in migration (respectively, a change in the employment structure) to the Novosibirsk agglomeration could affect the gross regional product dynamics. For an approximate assessment of a potential decrease (increase) in population density in the agglomeration, part of the employment was transferred from one territorial sector to another while maintaining the capital-labor ratio in the sector (with a corresponding change in long-term investments or fixed assets). Equation (1) was used to calculate the change in total shipped goods, provided that the number of employees and investments in the region in general did not change.

Previously, a three-sector optimization model of the region's economy was built based on the Cobb – Douglas production functions, with the sum of employed and fixed assets (long-term investments) unchanged (Druzhinin, 1990):

$$Y(t) = \sum_i A_i \times K_i^{\alpha_i}(t) \times L_i^{\beta_i}(t) -> \max. \quad (2)$$

Based on a special program, calculations of the optimal allocation of resources were carried out to maximize output without limitations and while fixing one of the indicators' structure by sector for 2014–2022. In an optimal structure, the sectors' return on assets ratio is determined by the assets elasticity ratio, and the sectors' labor productivity ratio is determined by the labor elasticity ratio.

Results

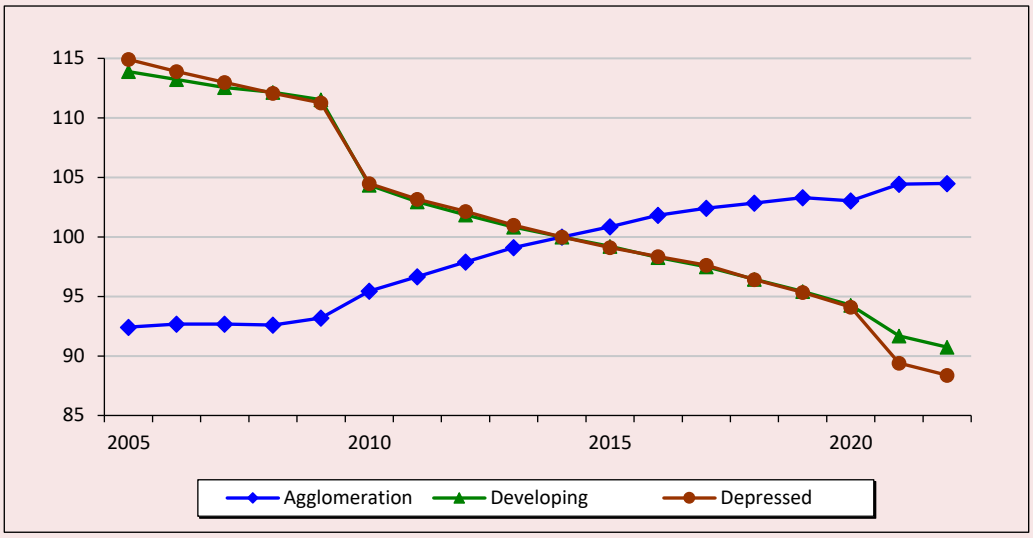
The Novosibirsk Region's population increased by 2.6% compared to 2000, in contrast to most regions of the Siberian Federal District (SFD): the district as a whole depopulated by 8.8%. The largest population in the region was recorded in 2018. It is worth noting that the number of employees peaked in 2012, and then it decreased by 3.4% in the Novosibirsk Region. Its gross regional product grew faster than that of other Siberian Federal District regions: compared with 2000 there was a 2.6-fold increase, and in the Siberian Federal District as a whole – 2-fold.

The difference in approaches to the allocation of agglomerations affects only the dynamics of developing municipalities' indicators, since the four municipal entities adjacent to the Novosibirsk agglomeration are developing faster than the remaining five (Barabinsk-Kuibyshev agglomeration), most likely due to their proximity to Novosibirsk. Of these, only Maslyaninsky District has low rates of average revenue and profit (Kolomak, Sherubneva, 2023). In the first allocation variant, the population and employment in the Barabinsk-Kuibyshev agglomeration are decreasing more slowly; investment, shipping volume and labor productivity are growing faster. In the second variant, labor productivity in the Barabinsk-Kuibyshev agglomeration increased only by 2/3 in 2014–2022, and in the expanded Novosibirsk agglomeration by 29%, which differs slightly from the first aggregation variant (28%). From henceforth, the second option is considered, which takes into account the geographical location of municipal entities.

About 58.4% of the region's population lives in Novosibirsk. Respectively, there is high production concentration in the Novosibirsk agglomeration, providing more than 80% of most indicators: more than 90% of shipped goods, and more than 95% of industrial output.

During the period 2005–2022, the population of the Novosibirsk agglomeration, as well as most of the largest agglomerations in Russia, increased. Migration is mainly directed to the Novosibirsk agglomeration; in 2023, only Barabinsky District had also positive net migration. Accordingly, the agglomeration population increased by about 13% in 2005–2022, while decreasing in the other two sectors by 22 and 23% *(Fig. 2)*. The sharp changes in population in 2010 and 2021 are due to a more accurate assessment based on the population censuses results.

Figure 2. Population dynamics of the three territorial sectors of the Novosibirsk Region compared to 2014



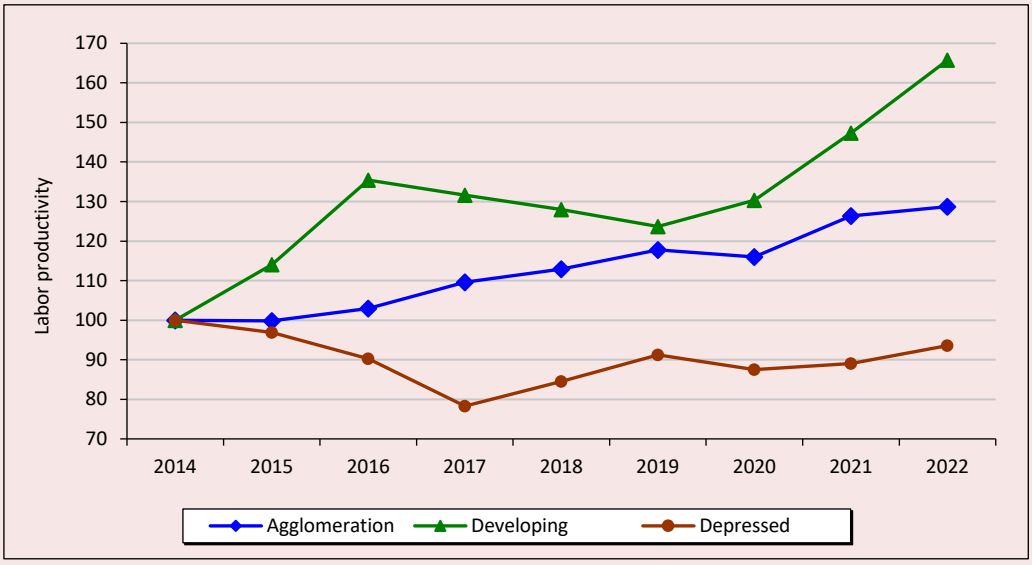
Source: own compilation based on Rosstat data.

The number of people employed in the region decreased, but in agglomerations this decrease was relatively small, by 13% in 2005–2022 in the metropolitan area and by 17% in the Barabinsk-Kuibyshev agglomeration, while in depressed municipal entities there was almost a 2-fold fall. However, investment changes differently: in the Novosibirsk agglomeration there was a 1.9-fold increase, while in the Barabinsk-Kuibyshev agglomeration – a 4.6-fold increase. As a result, the shipping volume grew faster in the Barabinsk-Kuibyshev agglomeration, about 1.4-fold, while in the Novosibirsk agglomeration – 1.2-fold. Accordingly, there was a 1.7-fold increase in labor productivity in 2014–2022 in the Barabinsk-Kuibyshev agglomeration, 1.3-fold in the Novosibirsk agglomeration, and a 7% decrease in depressed municipal entities *(Fig. 3)*.

The dependence of labor productivity on the capital-labor ratio was also analyzed, and the latter was calculated both on long-term investments over 4 years and on the assessment of fixed assets dynamics. In this work, linear homogeneous Cobb – Douglas production functions were used for aggregated territorial sectors, in which the sum of factor elasticities equals one *(Tab. 1)*. It should be emphasized that the difference in investment efficiency between the two agglomerations is insignificant and it is much greater than that of depressed municipal entities, which means that the efficiency of investments in the Barabinsk-Kuibyshev agglomeration is as great as in the Novosibirsk agglomeration.

Based on the results obtained, it was estimated how the region's output would change with a decrease or increase in migration between the sectors under consideration. The redistribution of the population (and employment, respectively) between sectors was analyzed. Since the employment in the Barabinsk-Kuibyshev agglomeration and depressed municipal entities is low (5.2 and 8.3%), the relocation of 1% of the employed from them to the Novosibirsk agglomeration almost does not increase the whole region's output. The reverse transfer of 1% of the employed to depressed municipal entities will lead to a

Figure 3. Labor productivity dynamics of the three territorial sectors of the Novosibirsk Region compared to 2014, %



Source: own compilation based on Rosstat data.

Table 1. Calculation data on the parameters of the Cobb – Douglas functions for the three economy sectors of the Novosibirsk Region in 2014–2022

Parameter	Parameter value and statistical characteristics		
	Novosibirsk agglomeration	Barabinsk-Kuibyshev agglomeration	Depressed municipal entities
ln A	1.843*	2.008*	-2.778*
α	0.594*	0.581*	0.163*
β	0.406*	0.419*	0.832*
R^2	0.95	0.72	0.56
p	0.00001	0.00360	0.08579

* $p < 0.01$.
Source: Rosstat data.

decrease in the regional output by about 0.3% and slightly less when transferred to the Barabinsk-Kuibyshev agglomeration, since the elasticity of assets of the two agglomerations differs slightly. If the regional authorities purposefully support the development of the Barabinsk-Kuibyshev agglomeration and migration from it stops, gross regional product losses will be insignificant at first, but in the future its development may contribute to the stabilization of the situation in neighboring municipal entities.

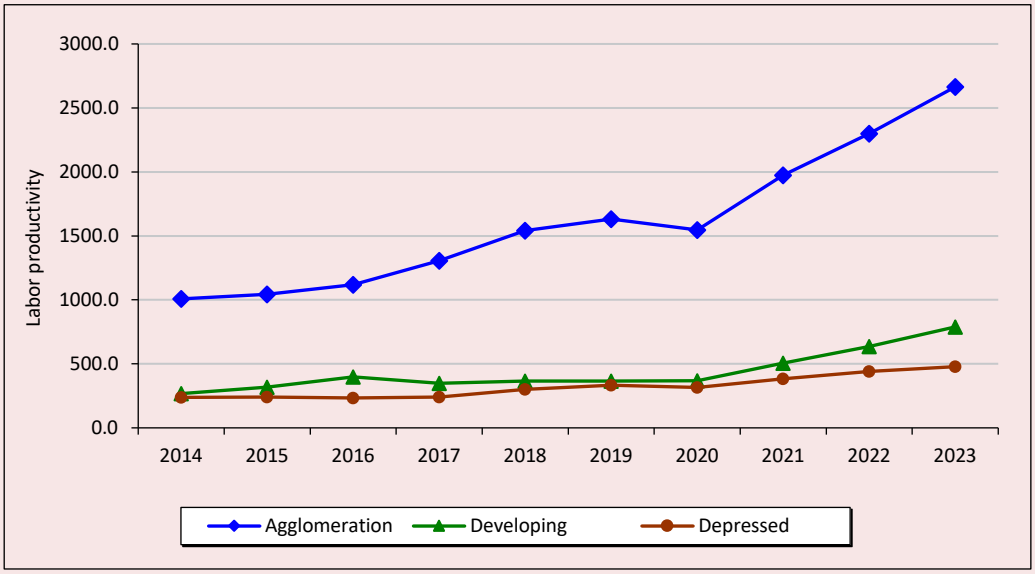
We have analyzed the differences between the real and optimal structure of the region's economy. Calculations on the optimal structure sometimes lead to unrealistic results with a sufficiently large difference in factor elasticities across selected sectors. In the Novosibirsk Region, the difference in elasticity between the two agglomerations is insignificant, there is a high production concentration in the efficient Novosibirsk agglomeration. As a result, the optimal economy structure is close to the real one *(Tab. 2)*.

Table 2. Calculation data on the optimal structure for the three economy sectors of the Novosibirsk Region for 2014–2022 (2014 – 100%)

Year	Actual values, shipped goods index	Unlimited calculations	Calculations with the fixed employment structure	Calculations with the fixed assets structure	Calculations with the fixed output structure
2014	100.0	104.7	101.7	101.7	101.3
2015	98.0	107.8	104.6	104.6	104.0
2016	99.0	110.6	107.3	107.3	106.4
2017	103.2	113.6	110.1	110.1	109.6
2018	106.7	117.0	113.5	113.4	113.2
2019	109.5	120.7	117.0	116.9	116.7
2020	108.0	125.0	121.2	121.0	120.7
2021	116.4	129.5	125.5	125.3	125.0
2022	119.8	134.0	130.0	129.6	129.1
Source: Rosstat data.					

In the Novosibirsk Region, output deviation is increasing from 4% in 2014 to 12% in 2022 without limitations and from 1 to 9% with limitations on the structure of assets or labor. Without limitations, almost all resources are moved to the Novosibirsk agglomeration, and with the fixed output structure, resources in the other two sectors are reduced by about half. In the Barabinsk-Kuibyshev agglomeration, with the fixed employment structure, there is a 3-fold decrease in the value of assets, and with the fixed assets structure, there is a 6-fold decrease in employment. Similar changes are in depressed municipalities. The main reason is high labor productivity in the industrial Novosibirsk agglomeration and the high proportion of agriculture in the Barabinsk–Kuibyshev agglomeration *(Fig. 4)*.

Figure 4. Labor productivity dynamics of the three territorial sectors of the Novosibirsk Region at current prices, thousand rubles



Source: own compilation based on Rosstat data.

Discussion

Our proposed new approach with the allocation of three sectors allowed us to show that there are municipal entities outside the metropolitan area that are developing no less successfully. The results obtained reflect certain differences typical for the Asian part of Russia. In European regions, periphery depopulation has a negative impact on the gross regional product dynamics, while in the Asian part it is rather positive: the faster region's periphery depopulates, the faster gross regional product per capita grows (Druzhinin et al., 2024). The dissimilar structure of the economy leads to a significant difference in labor productivity in the center and on the periphery. It has already been emphasized that labor productivity, as a rule, is much higher in an agglomeration than in territories outside it (Isaev et al., 2022). A change of residence leads to a more productive and profitable type of activity, which contributes to migration to metropolitan areas.

The development of municipal entities outside the metropolitan agglomeration is hindered by weak intermunicipal interactions; the influence of the metropolitan area on the periphery is minor; many agreements are formal; issues of agglomeration processes activation are not reflected or poorly reflected in regional strategic documents; there is no consistency of documents at different levels (Druzhinin, Kuznetsova, 2023; Sekushina, Kozhevnikov, 2024; Ugryumova, Savelyeva, 2023). As a result, there is a danger of "enclavization" of the region, when almost the entire population lives in its capital, and the rest of the territory, once densely populated, is being developed on a shift basis (Kopytova, Patrakova, 2024).

The Barabinsk-Kuibyshev agglomeration is small in terms of population, with fewer than 200,000 people living in it. A research of relatively small metropolitan areas has shown that they can develop successfully under certain conditions (Kozhevnikov, Voroshilov, 2024). The Barabinsk-Kuibyshev agglomeration has a significant number of institutions of secondary vocational education that train specialists needed for economic development, as well as a branch and representative office of universities. Their presence contributed to a rather slow decline in employment, unlike in depressed municipalities. The creation of new enterprises is currently hampered by the lack of qualified personnel, and therefore it is necessary to increase funding for the vocational education system.

The existing potential needs support primarily from the regional authorities. In addition to the development of educational institutions, it is necessary to promote the creation of more favorable living conditions for the population, including the renovation of social infrastructure and engineering networks, urban environment improvement and the creation of conditions for recreation and sports.

Conclusion

The paper considers the development of the Novosibirsk Region's municipal entities, identifies the Novosibirsk agglomeration, and, depending on the dynamics of the remaining municipalities and their geographical location, allocates two territorial sectors – successfully developing (Barabinsk-Kuibyshev agglomeration) and depressed municipal entities. Both sectors are losing population, but in the former, output and labor productivity are growing faster than in the Novosibirsk agglomeration.

During the indicators dynamics analysis and the construction of production functions, it was revealed that the efficiency of the Novosibirsk and Barabinsk-Kuibyshev agglomerations differs slightly, but a higher level of labor productivity leads to the fact that the flow of resources to the Novosibirsk agglomeration contributes to the efficiency enhancement of the whole region's economy. At the same time, further population concentration in the Novosibirsk agglomeration will eventually cause a deterioration in the indicators of the Barabinsk-Kuibyshev agglomeration,

accelerate the decline in employment in it and the process of desertification of the region in the west.

In the European part of the country, outside the Moscow and Saint Petersburg agglomerations, population outflow from the periphery leads to its desertification and decreasingly compensates for the population outflow from regional capitals to the Moscow and Saint Petersburg agglomerations, which causes a noticeable slowdown in gross regional product growth in most regions of the Northwestern Federal District, Central Federal District and Volga Federal District. To avoid such a scenario, it is necessary to develop regional programs in the Novosibirsk Region and other regions of the Asian part of the country to stimulate municipal entities with growth potential to increase funding for personnel training inside of them, and attract federal financing.

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Development of the Lithium Industry in Russia and China in the Context of Energy Transition and Achieving Carbon Neutrality

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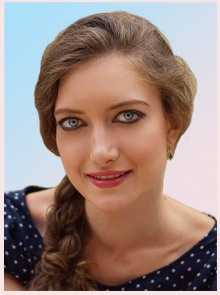

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Abstract. Currently, the world community is united in the problems of sustainable development of territories and enterprises, achieving carbon neutrality and transition to environmentally friendly forms of energy. An important element in solving these problems is the greening of public and personal transport, the motive power of which is based on high-power batteries. At the same time, the key component in batteries is lithium, which has already received large-scale use in a number of high-tech industries. Despite the fact that Russia ranks 14th according to lithium reserves, with about 1 million tons (0.95%) in its territory, lithium is not mined in the Russian Federation, and until 2022 the raw material was imported from Latin American countries. Rising prices for lithium, as well as a growing demand from electric car manufacturers, have increased interest in development of lithium projects among Russian companies such as Rosatom, Gazprom and Norilsk Nickel. In China, on the contrary, lithium production has increased 103-fold over the past 30 years – from 320 thousand tons in 1994 to 33 million tons by 2023, and the share of China in global production has increased by 13 percentage points, from 5.2 to 18.3%. Jiangxi Province can be considered the richest province, with large reserves of lithium minerals. This article aims to elaborate on conceptual directions for lithium production development in Russia and China as a key industry in transition to a green economy and achieving carbon neutrality. The information base for the research includes publications of domestic and foreign authors on the following issues: greening of global industry; reducing carbon footprint; features of lithium mining and production, as well as its use in electric vehicles. When writing the article, scientific methods such as comparative analysis and generalization, analysis and processing of statistical data were used.

Key words: Russia, China, lithium mining, lithium battery production, sustainable development, carbon neutrality, energy transition, batteries.

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Introduction

Issues of the global energy transition, use of environmentally friendly forms of energy for industry and transport and achieving carbon neutrality are relevant for the world community, in particular for Russia and China. To improve environmental situation in the world and some countries, it is important to develop the lithium industry as a key industry in transition to a green economy. Lithium is a key component in energy storage systems (batteries), which are widely used in environmentally friendly electric transport.

This article aims to design conceptual directions for development of lithium production as a driver of growth in the new energy industry. To achieve the goal, key trends in the lithium industry in Russia and China will be identified, indicators of lithium production and reserves by country of the world will be reviewed, development features of lithium battery production in China will be studied, analysis of industrial risks and prospects for development of lithium resources will be carried out, conceptual directions for development of lithium production will be presented.

We chose China as an object of research is due to the high importance of Chinese industry for the global economy, as well as the fact that China produces the largest amount of carbon dioxide emissions. Thus, by the end of 2022, the volume of CO_2 emissions in China amounted to about 12.7 billion tons, which is 2.6 times more than in the United States (4.85 billion tons, second place in the world), and 6.6 times more than in Russia (1.9 billion tons, fourth place in the world)[1].

Materials and methods

This work is based on use of systems and interdisciplinary approaches, involving analysis of new energy development in the context of lithium industry development. Research results are structured into four large sections:

The first one presents the dynamics of lithium production in the world and leading countries, shows the largest countries in terms of reserves of this raw material, reflects the imbalance of supply and demand in the lithium market, reflects basic information on development of the lithium industry in Russia and evaluates the development of lithium markets in China. The second section discusses development features of the lithium industry in China. The third section reflects development features of leading lithium battery production enterprises in Jiangxi Province as the region with the largest reserves of lithium minerals in China. Analysis of industrial risks and prospects for the development of lithium resources was carried out. The fourth section presents conceptual directions for development of lithium production.

The information base for the research included works of domestic and foreign authors on the following issues: greening of global industry; creating a green economy; achieving carbon neutrality and reducing our carbon footprint; features of lithium mining and production, as well as its use in electric vehicles

The following scientific methods were used: comparative analysis and generalization; literature review on research topic; analysis and processing of statistical data; presentation of results in tabular and graphical form.

Theoretical aspects

In publications of domestic and foreign researchers, the topic of the green transition, carbon neutrality and environmentally friendly economy of the ESG agenda has been relevant for quite a number of years. One of the main factors in transition to a green economy is the use of environmentally friendly transport, both public and personal. The problem that exists today is the fact that despite the absence of emissions and

[1] Top 10 countries with the highest CO_2 emissions in the world (unit: million tons CO_2) – 2022. Available at: https://worldpopulationreview.com/country-rankings/co2-emissions-by-country

carbon footprint from electric vehicles, cars are charged with using electricity, which in more than 60% of cases is generated from combustion of carbon sources of raw materials: coal, oil and gas (Salibgareeva, 2016).

Growing demand for green energy is accompanied by increased interest in raw materials such as lithium, as it is a key component in the production of lithium batteries. In the 21st century this resource is gaining increasing popularity in the global energy sector; it is called "new oil", and environmental damage from the use of batteries is significantly lower than from the use of hydrocarbons (Abdulkadyrov, Idrisov, 2022).

In addition, the great environmental danger of electric vehicles lies not in emissions of energy generation but in consequences of production processes and use of powerful batteries. During production of electric vehicles, 2 times more greenhouse gases are also released into the atmosphere, which is associated with increased energy consumption due to technological reasons (Kovalenko et al., 2022).

Scientists from the Faculty of Geography at Lomonosov Moscow State University are discussing the trend of Chinese dominance in the global lithium market. Data and forecasts for lithium production have been collected to describe the market structure. It is indicated that cartel agreements lead to higher prices in the lithium market and vehicle industry is becoming the leading driver of the lithium battery market. These are the determining factors of the lithium market for the future (Sinyugin et al., 2019).

By 2050, European countries plan to reduce greenhouse gas emissions by 80–95% from the 1990 level, which means a complete abandonment of vehicles with internal combustion engines. As a result of this, significant changes will occur in international trade – in the sales structure, maintenance costs, service specialists training (Zelenyuk, 2020).

Using renewable energy is a key part of energy transition as the world strives to achieve a zero-CO_2 future, energy independence and security. At the same time, to produce a wide range of products for the renewable energy sector, it is necessary to use rare earth metals and elements. (Mingaleeva, 2023).

Currently lithium production in Russia is characterized by a lack of production of lithium raw materials and a serious dependence on imports of lithium carbonate. A steadily growing demand for lithium from battery manufacturers creates favorable conditions for the development of the Russian lithium industry. The revival of production of strategic lithium raw materials for the purpose of import substitution is possible through the use of hydromineral deposits of underground brines in infrastructures of existing oil and gas enterprises and other economic entities (Boyarko et al., 2022).

A publication by scientists from the Institute of Economics and Industrial Engineering, Siberian Branch of the Russian Academy of Sciences addressed issues of energy cooperation between Russia and China in connection with China's "green transition", its reaching peak emissions in 2030 and its course toward achieving carbon neutrality by 2060. The authors noted that in the near future the key area of energy cooperation between the countries will be the development of the gas sector, since it is gas that is considered as a "transitional" fuel on the way from coal to renewable energy sources. In turn, China is actively switching to the use of gas in the energy and residential sectors. However, given the scale of the Chinese economy, coal will be in demand for a long time, since technological and economic reasons make it difficult to quickly abandon this raw material in favor of less carbon-intensive types of energy resources (Kryukov, Kryukov, 2022).

Studies conducted at the Siberian Federal University touch upon the topic of the formation of rules for countering climate change. They analyze the formulation of problems and goal-setting in

the process of institutional design of the ecological and climatic agenda, highlight the scientific and political-economic grounds for choosing the directions of the world community's response to the threats of climate change and related institutional changes. The mechanisms of shifting the priorities of sustainable development toward addressing climate issues and bringing to the fore the tasks of reducing greenhouse gas emissions through the transition to renewable energy sources (Kurbatova, Pyzhev, 2023) are shown. It was also noted that with the implementation of the accelerated transition to low-carbon sources of electricity, achieved through the transition of consumers to electric vehicles, by 2050, the expected reduction in greenhouse gas emissions will amount to 14.08 million tons of CO_2–eq, and 12.86 million tons if the current structure is preserved (Kolyan et al., 2023).

The studies provide an overview of an institutional project for the formation of new institutions for global response to the threats of climate change as a project to ensure the adaptation of economic activity to a new type of restrictions – climatic ones. It is considered in detail how it was replaced by the project of a low-carbon economy, that is, the creation of carbon neutrality restrictions for economic activity. It is shown that the response to the challenges of climate change is associated with the formation of intertwining institutional projects with different designers (at the global and national levels). Arguments are given in favor of the fact that, taking into account the inevitability of climate change, measures to adapt the economy and society to their consequences should come to the fore. It is recommended to intensify the formation of an institutional project that meets the national interests of creating competitive advantages of the Russian economy.

A researcher at the Center for Energy Research, Primakov National Research Institute of World Economy and International Relations (IMEMO) identified needs of lithium in electric batteries of various devices. Therefore, by 2025 the demand for lithium (relative to 2014) from mobile phone manufacturers will increase to 18.1 thousand tons (+2.2 times), in tablets – up to 16.8 thousand tons (+2.2 times), in laptops – up to 16.5 thousand tons (+2.2 times), in power tools – up to 15.8 thousand tons (+4 times), in hybrid cars – up to 55.7 thousand tons (+6.2 times), in electric vehicles – up to 360 thousand tons (+20 times). Global consumption of lithium in electric batteries will increase 8.6 times – from 55.8 to 480.5 thousand tons. The share of lithium demand for the production of electric vehicles will increase by 42.6 p.p. – from 32.3 to 74.9% (Sinitsyn, 2018).

The VolRC RAS journal *Economic and Social Changes: Facts, Trends, Forecast* has repeatedly published articles by colleagues from Jiangxi Academy of Social Sciences related to environmental issues and achieving carbon neutrality in this Chinese region. Deng Hong listed scientific approaches to environmental protection in underdeveloped areas of China, described organization's experience during periods of economic recovery and rapid economic development of the country and also considered current issues of strengthening environmental protection at the present stage (Deng, 2013).

Gao Mei updated ways to develop low-carbon production in Jiangxi Province, including: increasing the share of the tertiary sector in the economy; intensifying low-carbon production in three sectors of the economy; development and creation of technological innovations in low-carbon industry; creating a low carbon energy mix; carrying out transfer of industrial production within the country and abroad with the condition of developing low-carbon production (Gao, 2015).

Zhang Yihong highlighted the directions of integrated economic and environmental development of Jiangxi Province, which consist in emphasizing the priority of environmental protection and creating a harmonious ecological system,

importance of green development and building an effective ecological-economic system with low resource consumption, need for urbanization and expanding space for developing the integration of economics and ecology, introducing innovative solutions into the system for assessing and increasing performance of government bodies (Zhang, 2015).

In studies by foreign authors, as well as Chinese scientists, the issues of carbon neutrality, reducing atmospheric emissions and green economy are even more relevant. In response to climate change, the Chinese government has set a clear goal to reach its carbon peak by 2030 and achieve carbon neutrality by 2060, aiming to gradually reduce carbon dioxide (CO_2) emissions to zero (Zhao et al., 2022).

A joint publication by researchers from China and Denmark raised the question of environmental friendliness in obtaining lithium from solid minerals and brines. It is noted that lithium production in China mainly depends on hard rock lithium ores, which has disadvantages in terms of resources, environment and economics compared with lithium extraction from brine. Lithium extraction from ores, calcination, roasting, refining and other processes consume more resources and energy. Their environmental impact is accompanied by pollutant emissions from fossil fuel use, which is 9.3–60.4 times higher than the impact of lithium extracted from brines (Gao et al., 2023).

A paper by scientists from India National Institute of Technology and Australia Queensland University of Technology argues that electric vehicles (EVs) are the future of the automotive industry in terms of reducing greenhouse gas emissions, air pollution and improving living standards around the world. With the introduction of electric vehicles, there is a reduction in greenhouse gas emissions but an increase in human toxicity due to increased use of metals, chemicals and energy to produce powertrains and high-voltage batteries (Verma et al., 2022).

A report by UNESCO International Center for Global Geochemistry, the Institute of Geophysical and Geochemical Research of China and the Chinese Academy of Geological Sciences identified 31 geochemical anomalies that are associated with four types of lithium deposits: granite-pegmatite and igneous, salt lake brines and underground brines, clay rocks and secondary weathering clays (bauxites). New discoveries of anomalies, especially associated with clay rocks and desert basins, may provide potential areas for new sedimentary lithium deposits (Wang et al., 2020).

Researchers from the Chinese Academy of Geological Sciences noted that since 2012, certain progress has been made in study of resources, metallogenesis and integrated use of lithium deposits in China. First, advances have been made in lithium exploration in the provinces of Sichuan, Xinjiang, Qinghai and Jiangxi (autonomous area). Lithium deposits are found not only in pegmatite rocks but also in granite rocks and sedimentary rocks. Second, there have been improvements in geological exploration techniques, geochemical and geophysical surveys, remote sensing technologies and even drilling technologies that allow ore bodies to be quickly identified. Third, mechanisms of lithium mineralization have been summarized by analyzing the relationship between lithium contentand types of geological phenomena (Wang et al., 2020).

Scientists from the Institute of Mineral Resources of China claim that China will fully electrify traditional internal combustion engine vehicles (ICEVS) by 2050. Rapid development of electric vehicles (EVs) has led to continuous increase in demand for traction lithium-ion batteries (LIB), which has triggered increase in demand for specific lithium materials (Qiao et al., 2021).

Thus, research on achieving carbon neutrality, transition to a green economy, ESG agenda, as well as active role of lithium as a driver of these areas is significant for the global community and countries seeking to improve the environmental situation.

Research results

Development features of the global lithium industry

For 1994–2023 average annual global lithium production increased 11.5-fold – from 10.5 to 120.3 thousand tons, while the share of the five largest countries producing lithium increased from 72.8 to 98.6% (+25.8 p.p.).

At the end of 2023 Australia produced 86 thousand tons of lithium, which is 50.6 times more than in 1994 – 1.7 thousand tons. Its share in the world reached 47.8% of the world level, in 1994 – 27.9%. The country's strong industry development has been driven by a surge in investment activity in Australian lithium projects, highlighting Australia's rapidly growing role in the global battery materials supply chain. Combination of rapidly growing demand and significant local reserves of the metal has caused the Australian lithium market to intensify. SQM, a lithium giant in Chile, has committed to invest approximately 13.9 million US dollars to acquire a 19.99% stake in Azure Minerals, which owns a large stake in the Andover lithium project in Pilbara region of Washington in Western Australia[2].

Lithium production in Chile increased 22-fold – from two thousand tons in 1994 to 44 thousand tons in 2023. The country's share in the global level, on the contrary, decreased by 8.4 p.p. – from 32.8 to 24.4%. Chile is the second largest lithium producer after Australia. Along with the increase in production at Albemarle, the largest Chilean mine, the number of workers is also growing[3].

China ranks third in the world in lithium production, which in 1994 amounted to 320 tons, which is 103.1 times less than the level of 2023 – 33 thousand tons. The sharp increase in demand for lithium in the country is accompanied by an intensive increase in the production of electric vehicles, which is due to implementation of the Chinese Government's policy toward greening the economy. For 2021–2022 sales of electric vehicles in China increased by 82% and reached 6.2 million units. In Europe, by comparison, sales growth over the same period was only 15% to 2.7 million tons. Currently the problem of the sharply increased demand for lithium is resulting in the fact that the largest Chinese mining companies are investing in lithium mining projects abroad. However, the model of pumping resources has exhausted itself: countries that control the largest share of lithium production in the world are demanding that China become more adaptable to needs of the development of national economies[4].

In Argentina (4th place), active lithium mining began in 1998 by the American corporation Livent. This happened at a mine in Salar del Hombre Muerto – Catamarca province in northwestern Argentina[5]. During the period in question, lithium production in the country increased 1,200-fold and by 2023 amounted to 9.6 thousand tons. In January – February 2023, lithium exports doubled compared to the same period in 2022; in February, lithium supplies abroad were at a record level of 58 million dollars. A number of foreign companies operating in Argentina invest in lithium projects: Chinese Ganfeng Lithium and American Livent, which will send raw materials for production of batteries for BMW cars. Investments in Argentine lithium projects since 2020 amounted to 5.1 billion dollars[6].

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[2] Australia is striving to become a leader in lithium production. Available at: https://www.prometall.info/analitika/gornodobicha/avstraliya_rvyetsya_v_lidery_po_proizvodstvu_litiya

[3] The Chilean desert contains vast reserves of lithium, a key element for electric vehicle batteries. Available at: https://www.npr.org/2022/09/24/1123564599/chile-lithium-mining-atacama-desert?__ya_mt_enable_static_translations=1

[4] The race for lithium: from win-lose to win-win in new realities. Available at: https://asiabblog.com/2023/03/china-lithium-ev/

[5] Transition to green energy is actually destroying the eco-environment in Argentina. Available at: https://news.rambler.ru/tech/51652192/?utm_content=news_media&utm_medium=read_more&utm_source=copylink

[6] Argentina is betting on lithium exports amid agricultural decline due to drought. Available at: https://oilcapital.ru/news/2023-03-22 litiy-podderzhal-argentinskiy-eksport-2882626

Lithium production in Brazil (5th place) showed an increase of 153.1 times – from 32 to 4,900 tons. A distinctive feature of Brazilian lithium, mined in the state of Minas Gerais, is its high degree of purity, which allows it to be used to produce more powerful batteries. Therefore, lithium from Brazil has a competitive advantage that allows it to optimize investments[7]. For 1994–2023 total lithium production in the five leading countries increased by 43.7 times – from 4.1 to 177.5 thousand tons *(Tab. 1)*.

Data from the U.S. Geological Survey indicate the presence of lithium mining in Russia in 1994–2001 and in 2004–2006. In total, over these 11 years about 19 thousand tons or 1.73 thousand tons on average annually were produced.

Changes in lithium production volumes predetermined structural shifts in the leading countries on a global scale. The average annual share of Australia increased by 27.1 p.p – from 22.9% in 1994–1998 up to 50% in 2019–2023. Chile's share decreased from 29.6 to 25.1% (-4.5 p.p.). The share of China also decreased – from 17.8 to 15.6% (-2.2 p.p.). The average annual contribution of Argentina and Brazil to global lithium production increased to 5.7 and 2.2%, respectively *(Fig. 1)*.

In 2023 due to ongoing geological exploration identified lithium reserves around the world increased significantly (+7.2% by 2022[8]) and amounted to about 105.1 million tons *(Tab. 2)*. Taking into account global production of 180 thousand tons, which is equivalent to the lithium reserves in Ghana (21st place), we can conclude that the level of lithium extracted from subsoil by all countries of the world is only 0.17% of proven reserves. The potential for development of the industry is enormous.

Table 1. Dynamics of lithium production in the 5 leading countries for 1994–2023

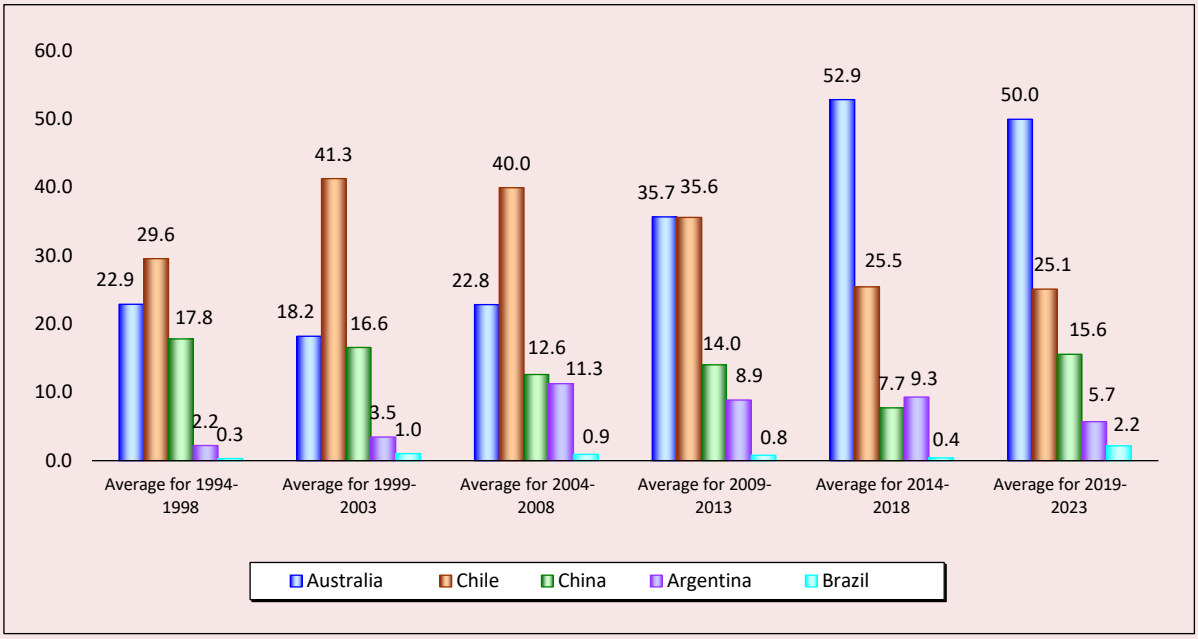
Period	Australia	Chile	China	Argentina	Brazil	Total	World share	World
	Tons						%	Tons
1994	1700	2000	320	8	32	4060	66.6	6100
Average for 1994–1998	**2400**	**3100**	**1868**	**232**	**32**	**7632**	**72.8**	**10480**
Average for 1999–2003	**2638**	**5980**	**2400**	**501**	**149**	**11668**	**80.6**	**14480**
Average for 2004–2008	**5278**	**9232**	**2914**	**2604**	**213**	**20241**	**87.6**	**23100**
Average for 2009–2013	**10708**	**10686**	**4210**	**2664**	**238**	**28506**	**95.0**	**30000**
Average for 2014–2018	**28040**	**13500**	**4100**	**4940**	**212**	**50792**	**95.8**	**53040**
Average for 2019–2023	**60140**	**30220**	**18740**	**6872**	**2610**	**118582**	**98.6**	**120300**
2023	86000	44000	33000	9600	4900	177500	98.6	180000
2019–2023 to 1994–1998	25.1 times	9.7 times	10.0 times	29.6 times	81.6 times	15.5 times	+25.8 p.p.	11.5 times
2023 to 2019	50.6 times	22.0 times	103.1 times	1200 times	153.1 times	43.7 times	+32 p.p.	29.5 times

Source: own compilation based on USGS data. Lithium Statistics and Information. Available at: https://www.usgs.gov/centers/national-minerals-information-center/lithium-statistics-and-information.

[7] Brazil has begun exporting green lithium to China. Available at: https://tvbrics.com/news/braziliya-nachala-eksport-zelenogo-litiya-v-kitay

[8] US Geological Survey, Mineral Commodity Summaries, January 2023, lithium. Available at: https://pubs.usgs.gov/periodicals/mcs2023/mcs2023-lithium.pdf

Figure 1. Average annual share of the five leading countries in lithium production for 1994–2023, %



Source: Own compilation based on data from the U.S. Geological Survey.

Table 2. Rating of countries by proven lithium reserves for 2023 and their share in the world

No.	Country	Lithium reserves, thousand tons	Share in the world, %	No.	Country	Lithium reserves, thousand tons	Share in the world, %
1	Bolivia	23000	21.9	13	Peru	1000	1.0
2	Argentina	22000	20.9	14	Russia	1000	1.0
3	USA	14000	13.3	15	Mali	890	0.8
4	Chile	11000	10.5	16	Brazil	800	0.8
5	Australia	8700	8.3	17	Zimbabwe	690	0.7
6	China	6800	6.5	18	Spain	320	0.3
7	Germany	3800	3.6	19	Portugal	270	0.3
8	Canada	3000	2.9	20	Namibia	230	0.2
9	Congo	3000	2.9	21	Ghana	200	0.2
10	Mexico	1700	1.6	22	Finland	68	0.1
11	Czech	1300	1.2	23	Austria	60	0.1
12	Serbia	1200	1.1	24	Kazakhstan	50	0.05
World total:						**105078**	**100**

Source: Own compilation based on USGS data (U.S. Geological Survey, Mineral Commodity Summaries, January 2024, lithium. Available at: https://pubs.usgs.gov/periodical/mcs2024/mcs2024-lithium.pdf)

The five richest countries in terms of lithium reserves, having 3.4 of all world reserves, are: 1 – Bolivia (23 million tons / 21.9%); 2 – Argentina (22 million tons / 20.9%); 3 – USA (14 million tons / 13.3%); 4 – Chile (11 million tons / 10.5%); 5 – Australia (8.7 million tons / 8.3%).

As for China (6th place), the U.S. Geological Survey estimates its reserves at 6.8 million tons or 6.5% of the world's reserves. With lithium production of 33 thousand tons in 2023 China uses only 0.49% of its potential.

Russia ranks 14th in lithium reserves, having about 1 million tons (0.95%) in the ground, while lithium is not mined in the Russian Federation and until recently all raw materials were imported from Latin American countries. In 2022 Argentina and Chile stopped supplies to Russia. They accounted for up to 80% of lithium purchases. In addition, for 2021–2022 lithium has risen in price on the world market by almost 8 times, so the profitability of its import compared to local production has begun to be questioned.

In this regard, Russia wants to begin industrial lithium production and companies such as Rosatom and Norilsk Nickel are planning to launch the first project at the Kolmozerskoye deposit in the Murmansk Region. The lithium project was also carried out by Gazprom and planned to extract it from the Kovykta deposit[9].

Currently most lithium concentrate projects are scheduled to begin in 2024. Companies involved in the transportation and storage of raw materials, as well as enterprises involved in the production and distribution of energy batteries and electric vehicles, acquire exclusive rights to explore and mine lithium.

Many countries recognize strategic importance of lithium resources. In Chile, Bolivia and Mexico lithium is included in the list of national strategic resources along with oil. Control over the exploitation of lithium resources in the world is being tightened.

According to the China Nonferrous Metals Industry Association, in 2021 the demand for lithium in the world was 434 thousand tons and the supply was 485 thousand tons. Supply exceeded demand by 51 thousand tons. *Table 3* shows the relationship between supply and demand for global lithium resources in 2020–2025, calculated taking into account the growth rate of the global economy.

Table 3. Demand and supply ratios for lithium in the world for 2017–2025, thousand tons

Period	Demand		Demand	Supply	Supply –Demand
	Cathode materials	Other			
2017	109.7	124	240	250	+ 10
2018	154.3	127	268	309	+ 41
2019	185.9	131	305	363	+ 58
2020	240. 9	128	369	422	+ 53
2021	298.9	135	434	485	+ 51
2022	369	137	507	533	+ 26
2023	460.9	140	601	624	+ 23
2024	577.7	143	721	730	+ 9
2025	731.6	146	877	854	-23
Source: China Nonferrous Metals Industry Association.					

[9] Russia will begin to produce new oil – lithium. Available at: https://rg.ru/2023/04/04/v-rossii-nachnut-dobyvat-novuiu-neft-litij.html

According to Canalys, an independent technology market research agency, global sales of electric vehicles totaled 6.5 million in 2021 or 109% year-on-year, accounting for 9% of total passenger car sales. As the global trend toward carbon neutrality continues, the annual growth rate of electric vehicle sales will exceed 40% in the next three years and global sales will reach 24 million in 2025. Considering that 230 thousand tons of lithium carbonate are required to produce 6.5 million electric vehicles, in 2025 demand will be about 880 thousand tons, which will lead to a long-term and permanent supply shortage.

Development features of the lithium industry in China

According to the data released by the Ministry of Natural Resources of the People's Republic of China, most of China's lithium mineral resources are located in Qinghai, Tibet, Sichuan and Jiangxi, with Sichuan accounting for 98.1% of all proven lithium deposits in the country *(Tab. 4)*. Qinghai and Tibet account for 73.1% of lithium brine deposits. Lepidolite minerals are mainly found in Jiangxi and Yichong. Although China appears to have a large reserve of all types of lithium ores, the concentration of lithium in the country's salt lakes is less than 500 mg per liter, and the low quality of mineral formations and the high content of magnesium ions impurities make it very difficult to extract lithium from the mined raw materials. In addition, Qinghai Province and the Tibet Region are characterized by harsh water conditions, poor infrastructure, including transport and high-mountainous location, which greatly hinders the extraction of raw materials and the exploration of new deposits. Environmental regulations have also hampered the industrial exploitation of lithium resources, leading to supply shortages. As a result, Chinese lithium mining enterprises are still in dire need of importing high-quality lithium raw materials. Currently, dependence on imports is more than 70%.

In recent years, China has adopted a number of documents aimed, among other things, at developing the production of lithium batteries and markets for their subsequent use. Such measures create a favorable climate for development of the production of electric batteries and energy storage systems. Lithium battery industry will enter an upswing phase.

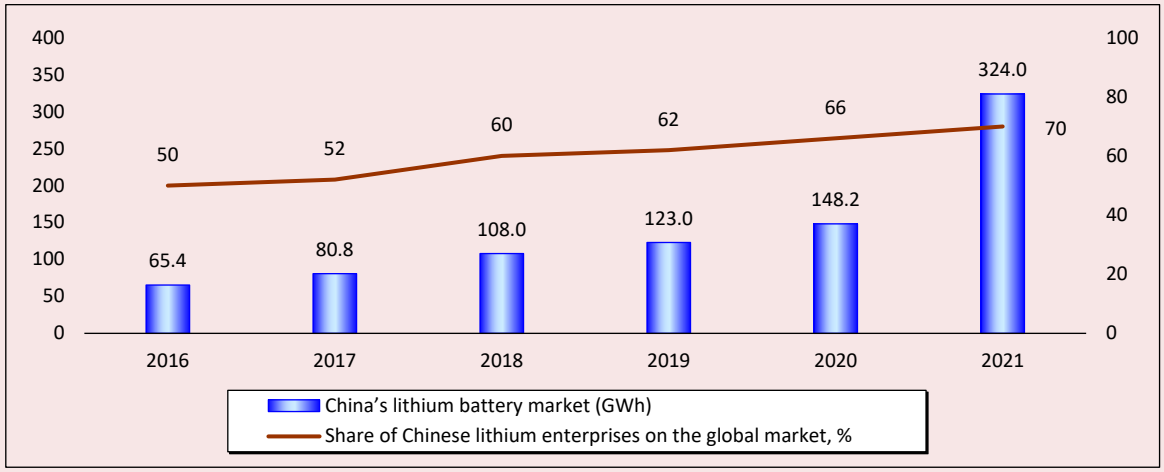
By the end of 2021 the global lithium battery market capacity was 545 GWh, the Chinese market was 324 GWh, accounting for 59.4% of the former. For five years, China has been the largest lithium battery consumption market with a market share of 70% *(Fig. 2)*.

The annual profit from lithium battery production was 370.6 billion yuan or 125.5%. At the same time, imports of lithium carbonate increased over four years and in 2021 amounted to 81 thousand tons with an annual growth of 61.7% *(Fig. 3)*.

Table 4. Distribution of proven lithium oxide resources in China, thousand tons

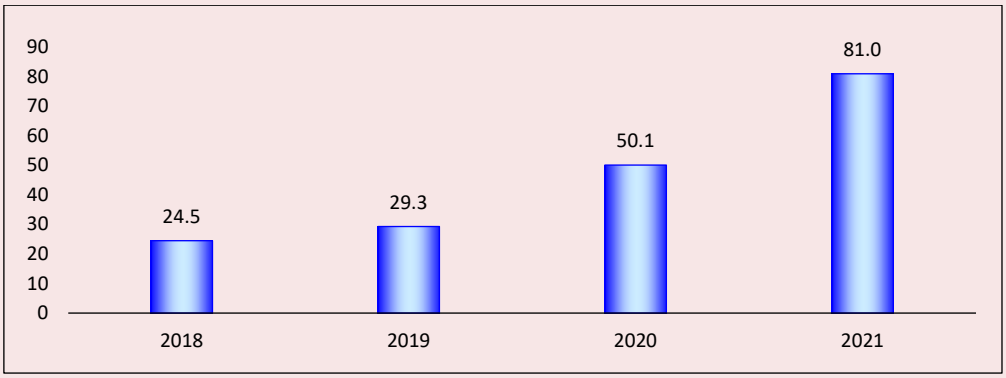
Territory	Resources	Type of minerals
Qinghai	1518	Lithium salts
Tibet	197	Lithium salts
Sichuan	217	Spodumene
Jiangxi	369	Lepidolite
Total	2345	-
Source: China Mineral Resources 2022.		

Figure 2. China lithium battery market size and global market share of Chinese lithium enterprises, 2016–2021



Source: Ministry of Industry and Information Technology of the People's Republic of China.

Figure 3. Import of lithium carbonate to China for 2018–2021, thousand tons



Source: Ministry of Industry and Information Technology of the People's Republic of China.

Experience in the development of lithium production in China with the example of industrial enterprises in Jiangxi Province with the largest reserves of lithium minerals in the country

Jiangxi is one of the four provinces with large reserves of lithium minerals. The main part of deposits is located in the Jiuling and Ugushan metallogenic zones. The city of Yichun is called the lithium capital of Asia, as it is home to the world's largest polymetallic lepidolite mine. According to public information, the lithium oxide reserves in the city of Yichun and the surrounding areas amount to more than 2.58 million tons or 40% of the country's lepidolite reserves, from which approximately 62.5 million tons of concentrate with a lithium oxide content of 4% can be obtained. Lepidolite mines of prefecture-level city of Yichun are located in 4 areas: Yifeng County, Fengxin County, county-level city of Gao'an and Yuanzhou District.

Advantages of China's Leading Lithium Battery Enterprises

1. Ganfeng Lithium – vertical expansion of production and creation of lithium circulation in industry. Founded in 2000, Ganfeng Lithium is a

world leader in the production of lithium products (five main production lines and more than 40 lithium compounds and metals). As the product range increased and productivity improved, the company gradually invested in the mining of lithium raw materials and actively developed the production and processing of lithium batteries. The company created the industrial lithium cycle and took a leading position. Ganfeng Lithium owns rich metal deposits in Australia, Argentina, Ireland, Mexico, as well as in Jiangxi and Qinghai, with the help of which the company has formed a sustainable mining system for raw materials. Mount Marion and the Pilbara in Australia are the company's main sources of lithium concentrates.

2. CATL – horizontal expansion of production, storage devices and rapid replacement of batteries. Founded in 2011, CATL develops, manufactures and markets battery and energy storage systems for new energy vehicles. The company pays great attention to research and innovation, investing approximately 6% of profits in them. CATL has developed six technical development concepts: high energy density, long service life, fast charging (XFC) batteries, safety, automatic temperature control and intelligent control. The technical indicators of the batteries produced by the company are at a high level. For example, the cell density reaches 330 Wh/kg, the maximum service life is 16 years, the range is 2 million kilometers, and the battery itself is charged to 80% in 5 minutes. CATL is a leading Chinese manufacturer of batteries for new energy vehicles.

Risk analysis for lithium battery industry development

Driven by factors such as the new wave of the pandemic, deteriorating Sino-U.S. relations, European Union (EU) interventions and rising geopolitical tensions, lithium battery industry in Jiangxi still faces a number of risks hampering its development, including:

1. "The prisoner's dilemma" and intensification of regional competition.

Xinyu City's "Thirty Articles on Lithium Batteries" talks about approaching leadership in the global lithium battery market. "Proposals for the Accelerated Development of the New Energy (Lithium Battery) Industry 2021–2025" of Yichun City notes expansion and strengthening of influence of the lithium capital of Asia in the new energy (lithium battery) industry. "Development Plan of the New Energy and New Energy Automotive Industry in Ganzhou (2021–2025)" proposes to promote expansion, development and strengthening of the new energy industry in accordance with requirements of all leading vehicle and lithium battery manufacturing enterprises.

2. Insufficient number of enterprises producing final products.

Considering development trends of the lithium industry within the country and abroad, the main areas of application of lithium batteries include the production of household appliances, alternative energy sources and energy storage systems. However, most enterprises in the provincial lithium battery industry are involved in the extraction and processing of raw materials rather than the production of end products, which is a serious problem.

The policy of "double control" of energy consumption hinders industrial expansion

In the lithium battery industry of Jiangxi Province, the largest production volume comes from lithium ore smelting, anode material creation and graphitization. All this requires a lot of energy. In addition, local porcelain clay contains low quality oxide. The energy costs for its processing significantly exceed the costs of extracting lithium from lepidolite. Cost limits are set in energy consumption in the production of lithium salt. The "dual carbon" and "dual control" energy consumption policies are putting strong pressure on the development of new lithium battery projects in Jiangxi Province.

Conceptual directions for development of lithium production as a growth driver for the new energy industry

In connection with actualization of the issue of the new energy industry in different countries, the issue of development of lithium production is being raised at the state level. For example, Xi Jinping, General Secretary of the CPC Central Committee, notes: "Without a long-term strategy, short-term achievements are impossible. Without full consideration, simple actions are not feasible". Looking at lithium battery industry in its recovery phase, it can be said that it has a bright future ahead of it. Jiangxi is rich in natural resources and has advanced manufacturing. The province should use the "dual carbon" policy to accelerate emergence of a new clean energy industry and accelerate its development.

In the Russian Federation, there is a significant shortage of lithium, which is used primarily in nuclear power, energy storage systems and as a raw material in production of slag-forming mixtures for ladles, lubricants for mining industries, and creation of production of lithium-ion batteries. The Russian market is represented only by lithium processing facilities. Enterprises operate entirely on imported raw materials and capacity utilization level is estimated at 30%. Accelerated implementation of a set of measures to support development projects for extraction of lithium ores in 2023–2030. In areas of the Zavitinskoye, Polmostundrovskoye, Kovyktinskoye, Yaraktinskoye and Kolmozerskoye deposits will largely meet Russia's internal needs for lithium raw materials[10].

Based on the synthesis of experience of different countries and successful practices in development of lithium production in Chinese province of Jiangxi, research presents four directions for the development of lithium production.

1. Promoting joint development of enterprises.

Differentiated development is such because of different types of resources, location and different advantages. The Chinese province of Jiangxi is divided into eleven prefecture-level cities: Nanchang, Fuzhou, Ganzhou, Jian, Jingdezhen, Jiujiang, Pingxiang, Shanzhao, Xinyu, Yichun and Yingtan. For example, Yichun is characterized by the integrated development and use of lepidolite, the production of lithium carbonate, anode and cathode separator materials, aluminum film and lithium batteries. Xinyu produces lithium salt and aims to create a new industrial base for lithium batteries. Ganzhou is characterized by recycling and recycling of energy batteries and accumulators. Jiujiang focuses on the production of electrolytes. In Nanchang, Shanzhao and Fuzhou, special attention is paid to the production of lithium batteries for energy vehicles. It is necessary to promote integration and joint development of all areas of production by establishing cooperation between leading lithium battery enterprises, large automobile and photovoltaic companies, promoting the complementarity of resources, full use of advantages and joint development of enterprises.

2. Strengthening production, supply chain and creating a lithium battery industry ecosphere.

It is necessary to use government support measures, strengthen production and ecosphere of lithium battery industry, to use resources of areas with rich lithium reserves to build a strong lithium industry. It is important to strengthen resource support and build a strong supply chain, as well as improve resource exploitation capabilities, accelerate comprehensive supply organization, build a lithium battery recycling system, build a competitive material and processing base, and carry out joint balanced, coordinated and environmentally friendly development of production of basic and auxiliary materials for production lithium batteries. It is necessary to optimize and improve conditions for industrial development and expansion of production areas.

[10] RF Government Resolution 4260-r, dated December 28, 2022. "On approval of the development strategy of the metallurgical industry of the Russian Federation for the period until 2030". Available at: https://www.garant.ru/products/ipo/prime/doc/405963845/

3. Using innovations.

It is important to promote innovative development of enterprises, help them create new projects and technology, conduct research and develop new electrode materials (lithium-manganese cathode materials, silicon-carbon anode materials, high-voltage electrolyte materials and separators), lithium-ion batteries with a new power system and all-metal blocks. It is necessary to implement a mechanism to stimulate technological innovation, encourage application of lithium products in related fields and encourage enterprises involved in the production of battery components, accumulators and vehicles to realize joint innovation and technical breakthroughs.

4. Attracting qualified personnel, creating training infrastructure and promoting environmental development of industry.

It is necessary to attract qualified personnel to work and produce lithium products, create thematic training programs in educational institutions for the development of the lithium industry. It is also necessary to establish educational institutions that will produce specially trained personnel. It is necessary to help large lithium enterprises implement the "dual carbon" policy, accelerate, simplify regulation and reduce carbon emissions, build an energy management system and create environmentally friendly production. It is important to carry out intelligent transformation of lithium battery production enterprises, support these enterprises in modernizing production through the use of AI (artificial intelligence).

Conclusion

1. Greening the global economy, transition to green energy and achieving carbon neutrality are becoming pressing issues for the 21st century. One of the key ways to achieve these goals is to reduce atmospheric emissions through increased production and the use of environmentally friendly public and personal transport. This type of transport includes electric vehicles whose engines run on high-power lithium batteries. However, despite the environmental friendliness of these cars, production and disposal of batteries, as well as their charging, is associated with a significant environmental burden.

2. High potential for development of the lithium industry in the world has been identified. This is due to the fact that, according to the U.S. Geological Survey for 2023, there are approximately 105.1 million tons of proven lithium reserves worldwide. At the same time, just under 0.2% of the world's lithium reserves are mined. The richest lithium reserves are Bolivia (23 million tons / 21.9%), Argentina (22 million tons / 20.9%), USA (14 million tons / 13.3%), Chile (11 million tons / 10.5%) and Australia (8.7 million tons / 8.3%). China ranks 6th in lithium reserves (6.8 million tons / 6.5%) and Russia ranks 14th (1 million tons / 0.95%).

3. It was determined that for 1994–2023 global lithium production increased 29.5 times – from 6.1 to 180 thousand tons. The top five in production for 2023 included countries such as Australia (86 thousand tons / 47.8%), Chile (44 thousand tons / 24.4%), China (33 thousand tons / 18.3%), Argentina (9.6 thousand tons / 5.3%) and Brazil (4.9 thousand tons / 2.7%). In total, they account for about 98.6% of global lithium production, and the greatest growth was observed in Argentina (+1200 times), China (+103.1 times), Australia (+50.6 times), Brazil (+32 times), Chile (+22 times). In Russia, despite the presence of reserves (about 1 million tons), lithium is imported from Latin American countries; however, the instability of the geopolitical situation and prices provoke the domestic industry toward development and independence.

4. Based on the analysis of development of lithium battery production under the new energy industry of the Chinese province, it was determined that most of China's lithium mineral resources are located in Qinghai, Tibet, Sichuan and Jiangxi, with Sichuan accounting for 98.1% of all proven lithium deposits in the country. Qinghai and Tibet account for 73.1% of lithium brine deposits, and lepidolite

minerals are mainly found in Jiangxi and Yichong. For 2016–2021 the size of the Chinese lithium battery market has grown 5 times, from 65.4 to 324 GWh. The share of Chinese lithium enterprises in the global market increased by 20 p.p. – from 50 to 70%. The expansion of electric car production in China has led to increased imports of lithium carbonate into the country. In total for 2018–2021 purchases of these raw materials increased 3.3 times – from 24.5 to 81 thousand tons.

5. The following were highlighted as conceptual directions for the development of lithium production as a growth driver for the new energy industry: promoting joint development of enterprises; strengthening production, supply chain and creating a lithium battery industry ecosphere; using innovations; attracting qualified personnel, creating training infrastructure and promoting environmental development of lithium battery industry.

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Administrative Barriers to the Growth of Microenterprises: Typology and Empirical Assessment

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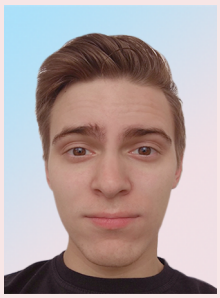

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Abstract. In order for the Russian economy to become "stable and dynamic", as it is stated in one of Russia's national goals, it is necessary to search for economic growth sources. Microenterprises may become one of them; this type of business is most widespread, although not enough research is devoted to its research. The key reason that impedes the development of microenterprises is the barrier that makes it difficult for them to move into another category. Only 3% of actors are able to overcome the barrier of increasing administrative burden, and grow from micro- to small enterprises. The consequences are the problems of artificially slowing growth, non-payment of taxes and fragmentation of business. The aim of the research is to empirically identify and develop a typology of microenterprise growth groups in the regions of Russia based on their overcoming the barrier to transition to small business, and to assess regional and sectoral differences for national and regional economic growth. Using the methods of text mining and content analysis of foreign and Russian publications, we introduce the term "administrative barrier to the growth of small and midsize enterprises". To understand the scale of the problem, we create a typology of microenterprises, which includes four growth groups: those who did not approach the barrier, those who approached it, those who were close to the barrier, and those who overcame it. The provisions of our paper are of theoretical importance and can contribute to the evolutionary theory of company growth. For an empirical assessment, we analyze an extensive unique database on the growth of 63,674 microenterprises from the SPARK service (all industries and constituent entities of the Russian Federation over a five-year period). Scientific novelty consists in our methodological approach that makes it possible for the first time to establish the number of microenterprises whose growth slowed down due to the transition barrier. Correlation analysis methods have confirmed the hypothesis about the increased ability of microenterprises in the manufacturing industry to overcome the transition barrier. The acquired knowledge raises scientific and governmental awareness of the importance of growing microenterprises' development. Practical significance of the methodology consists in identifying microenterprises with growth potential from a large array of microenterprises in the region and also in forecasting barriers to development. It is necessary to put forward scientifically substantiated prerequisites for overcoming barriers, and to take them into account in the emerging policy aimed to support growing microenterprises as a priority category.

Key words: growing microenterprise, barrier to SMEs growth, company growth theory, content analysis, administrative barrier, microbusiness, growth source, small and medium entrepreneurship.

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Introduction

The President of the Russian Federation V.V. Putin noted: "The pace and, most importantly, the quality of growth make it possible ... to assert that ... we ... will be able to become one of the world's fourth largest economy"[1]. The question arises: who will realize such intensive economic growth? The list of untapped growth drivers is limited. Microenterprises are proposed to consider

[1] Presidential Address to the Federal Assembly on February 29, 2024. Available at: http://www.kremlin.ru/events/president/transcripts/messages/73585 (accessed: March 4, 2024).

as a source of additional economic growth. First, among all categories of business, microenterprises are the most massive segment – 5.9 million entities, or 95.8% of business[2]. The greatest attention of both politicians and researchers in Russia is traditionally paid to the less widespread categories: small enterprises (227.3 thousand subjects, or 3.7% of business), medium enterprises (20.7 thousand, or 0.3%) and large business (13.6 thousand, or 0.2%). Second, comparing the available data, we can conclude that microenterprises make an increased contribution to economic growth (second only to large businesses). The revenue of microenterprises for 2020 amounted to 44.1 trillion rubles, which is more than that of small (26.6 trillion rubles) and medium (10.0 trillion rubles) enterprises[3]. Third, larger firms are more easily resilient to environmental conditions, including growth barriers, than micro and small enterprises (Ernst, 2004). Given the significance and scale, the focus of the study was directed to such a relevant and rare object of research as growth-oriented microenterprises.

Administrative and other barriers to the development of microenterprises have long been a problem. According to the Ministry of Economic Development of the Russian Federation, only 3% of microenterprises out of all small and medium enterprises (SMEs) moved to the category of "small enterprises" for the period 2021–2022[4]. For the transition the subject is required to exceed the value of the established criteria. One of the key criteria is the size of the business, determined primarily by the volume of revenue. It is required that the revenue exceeds the value of 120 million rubles for three consecutive years[5] to reach the category of a small enterprise.

The legislation establishes a stricter administrative burden for small enterprises. In particular, the transition of microenterprises is hampered by such administrative barriers to growth as increased taxes (Litau, 2013), reporting, supervisory inspections[6] and others. To avoid this, some microenterprises start to artificially split the business by dividing it into several new entities. On the one hand, if after the split the separated enterprise grows, it contributes to the increase. But it cannot be evaluated separately. On the other hand, fragmentation leads to non-payment of a significant part of taxes. The barrier not only creates additional risks for the microenterprise itself, but also increases the negative consequences for Russia's economic growth. The costs of enterprises from fragmentation reduce economic growth, so the article considers the impact of microenterprises on economic growth through the rise of microenterprises themselves, overcoming the relevant barrier.

Representatives of the authorities also point to this problem, noting that conditions are needed so that, starting from microenterprises, businesses can move smoothly into the next category[7]. Daniil Egorov, Head of the Federal Tax Service, called the problem of barriers to the transition of business into larger forms not fully explored[8]. To address these problems, the authorities plan to prioritize a

[2] Statistics. *SME.RF Digital Platform*. Available at: https://мсп.рф/analytics/ (accessed: July 17, 2024).

[3] Results of the continuous monitoring of the activities of small and medium enterprises in 2020. *Federal State Statistics Service*. Available at: https://rosstat.gov.ru/small_business_2020 (accessed: February 22, 2024).

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[6] Growing SMEs in Russia and abroad: role and place in the economy (2010). Moscow: Foundation Small Business Resource Center. 63 p. NISSE. Available at: https://nisse.ru/articles/details.php?ELEMENT_ID=129340 (accessed: January 23, 2024).

[7] Meeting of the Government Commission for the Development of Small and Medium Enterprises. Available at: http://government.ru/news/48593/ (accessed: May 31, 2023).

[8] The authorities proposed to fine-tune support for small and medium businesses. AO "Rosbusinessconsulting". Available at: https://www.rbc.ru/economics/29/05/2023/647455269a794773b153a168 (accessed: May 31, 2023).

group of "growing microenterprises" [9]. It is expected that their qualitative growth will occur as a result of support. The support is expected to result in their qualitative growth. This problem is specific to Russia, so it is necessary to identify microbusinesses whose growth is constrained by barriers. Under these conditions, there is a growing need to study the microenterprises' ability to overcome barriers to transition to a larger business category.

Addressing these challenges is limited by the lack of academic research on the transition barriers of microentrepreneurs. The uniqueness of the category lies in the fact that microenterprises are often created through entrepreneurial spirit and are characterized by flexibility, innovation (Eneh, Okezie, 2009). Foreign researchers show that microenterprises play a key role in poverty alleviation. For example, it is believed that poverty in developing countries such as the Asian Tigers has been reduced by 20% in two decades due to the development of micro, small and medium enterprises (Eneh, 2007; Ogunsanya, 2007). However, only a few microenterprises actually play a critical role in stimulating economic progress, as part of this sector is satisfied with its current situation and does not attempt to grow.

Under these conditions, microenterprises are a relatively new and insufficiently studied object of the article (Zemtsov, Maskaev, 2018). Gradually, researchers from describing the problems of microenterprise development, studying their sectoral and regional characteristics (Ibragimova, 2016) are moving to a systematic understanding of their contribution to national and regional economic growth (Ernst, 2004; Eneh, Okezie, 2009). For instance, the authors note that microenterprises account for a significant share of the gross product created (Mirkina, 2023). However, the potential of microenterprises as a source of economic growth in Russian regions is insufficiently assessed.

The significance of the scientific problem solved in the study lies in the lack of reliable knowledge about growing microenterprises as a segment selected by the Government of the Russian Federation as a priority category capable of making an increased contribution to GDP growth[10]. Achievement of the government's plans is hampered by insufficient elaboration of theoretical provisions on the barriers of growing microenterprises and limited tools for their analysis.

The aim of our research is to empirically identify in Russian regions and develop a typology of microenterprise growth groups on the basis of their overcoming the barrier of transition to a larger category of business, as well as to assess regional and sectoral differences for national and regional economic growth. In this regard, we have set the following tasks:

1) generalization of the conceptual and terminological apparatus and introduction of the term "administrative barrier to the growth of SMEs" by means of text mining and content analysis of foreign and Russian scientific publications;

2) development and testing on empirical data of the typology of microenterprise growth groups on the basis of their overcoming the barrier of transition to a larger business category;

3) creation of a methodological approach to establish a microenterprise growth group depending on proximity to the barrier for a wide range of subjects, Russian regions and industries;

4) identification of microenterprises, including two groups: those that continued growing (moved to the category of "small enterprise") and those that did not overcome this barrier.

The scientific novelty of the study is expected to lie in our own original approach to the segment of "growing microenterprises" (an extremely rare object of research) as an alternative source of economic growth.

[9] Meeting of the Government Commission for the Development of Small and Medium Enterprises. Available at: http://government.ru/news/48593/ (accessed: May 31, 2023).

[10] Ibidem.

Scientific approaches to understanding administrative barriers to SMEs growth: review of definitions

The scientific basis for studying the enterprise growth is the existing set of microeconomic theories of growth, including stochastic, evolutionary and strategic theories. Within the framework of the evolutionary theory of company growth, I. Adizes proposed to distinguish special barriers to growth in the concept of the life cycle of an organization (Adizes, 1988). He reflected several scenarios of barriers occurrence at different growth cycles (e.g., "death in infancy", "founder's trap", etc.). But the conceptualization did not directly point out the relationship of these negative scenarios to barriers of transition to a larger business category.

Publications periodically raise the problem of companies' transition from one category to another. Researchers traditionally emphasize the issue concerning transition of small enterprises to medium enterprises. It was noted that the refusal of growth occurs because "in Russia, small businesses have no serious incentives to become medium"[11]. But the barrier to growth for microenterprises was not considered (although it is the one that arises earlier). There were only some attempts to calculate the number of enterprises that changed their category from small to medium and (or) large business[12]. Sometimes the transition of medium companies to large ones is emphasized. Interesting approaches to identifying barriers to transition are beginning to emerge. For example, a research question is posed: where the growth of successful SMEs "transitions": (a) they continue growing, gradually becoming large, including absorbing other growing companies; (b) they are absorbed by a large business or were originally subsidiaries and dependent on it and due to this growth; (c) they lose the speed of development and "split" into smaller ones, approaching some barrier" (Blokhin, Glukhov, 2024). Unfortunately, not all provisions can be applied to assess transition barriers in microenterprises, e.g., to measure growth caused by affiliation with large companies, banks, retail chains, as such data are limited.

Researchers are not as active in linking growth barriers to the problems of microenterprise transition as Russian authorities. For example, Minister of the Ministry of Economic Development of Russia, M.G. Reshetnikov noted that microenterprises "cannot cope with growth barriers"[13].

In this article, we searched for this and similar definitions to summarize the approaches to the content of the term "administrative barrier to growth". We applied the methods of text mining and qualitative content analysis (Glukhikh, 2022) of foreign and Russian studies. We compiled a large set of search words (more than 50). They were used to search for relevant concepts. We used the following resources in the search: 1) Google search engine; 2) Google Scholar; 3) Bing search engine; 4) CyberLeninka electronic library; 5) ChatGPT 4o chatbot for collecting and reviewing publications (in accordance with the researchers' recommendations to consider ChatGPT as an assistant in literature review and information gathering (Bringula, 2023)).

A lengthy search did not turn up a definition that clearly denotes growth *(Tab. 1)*. The only exception is the first definition, which gives a related, but not equivalent concept "institutional barriers to company growth", including not only administrative factors, but also other external conditions. We also found several definitions that use the category "growth" and similar ones in their content. More often there are terms related to "administrative barriers", insufficiently reflecting the negative impact on growth. Only sometimes barriers are described as obstacles to the development of SMEs. Barriers are treated in the same way

[11] Growing SMEs in Russia and abroad: Role and place in the economy (2010). Moscow: Foundation Small Business Resource Center. 63 p. NISSE. Available at: https://nisse.ru/articles/details.php?ELEMENT_ID=129340 (accessed: January 23, 2024).

[12] Ibidem.

[13] Meeting of the government commission for the development of small and medium enterprises. Available at: http://government.ru/news/48593/ (accessed: May 31, 2023).

Table 1. Overview of definitions close to the term "administrative barrier to the growth" of SMEs

Definition	Author(s), year	Advantages of the definition	Limitations of the definition
The term itself uses the category "growth"			
"Institutional barriers [to company growth], i.e. non-market obstacles created by the conditions of the legal environment, major market players, business customs, rules for servicing VIP clients by market infrastructure organizations, and opportunities for organizational and management reform of companies"	(Blokhin, Likhachev, 2021)	Generalizing characteristic, is clarified thanks to the feature containing various reasons for the emergence of barriers, which better helps to understand their complex nature; the importance of institutional barriers to economic development is emphasized	Due to the extensive coverage, it is more difficult to perceive the specific impact of each factor on the enterprise; there is uncertainty about the impact of barriers on the business climate and entrepreneurship
The definition uses the category "growth" and similar, but not in the term			
"Administrative barriers, i.e. numerous obstacles on the part of government and management bodies related to the need to comply with mandatory rules and procedures stipulated by legislative and regulatory acts, as well as acts and actions of government bodies and their officials, which unreasonably restrict the freedom of entrepreneurial activity and impede the creation and development of new entrepreneurial structures"	(Kochmola, Evlakhova, 2004)	The definition cites two sources of barriers rather than one, including the activities of legislative and executive authorities, inspectors, etc...; several ways in which the barrier may arise (acts and actions of legislators, officials); the severity of the problem is emphasized and the impact on the enterprise is indicated as a consequence of the existence of the barrier	It does not specify which categories of barriers are meant; the definition does not well group the ways in which a barrier appears ("rules" and "procedures" are separated from "acts", but together with "actions").
"In this article, by the term "administrative barriers" we mean external unfavorable factors, conditions for the creation of a new business or the development of an existing firm"	(Romiti et al., 2011)	The importance of conditions for new business creation and the development of existing firms is pointed out	There is no indication of the concretization of barriers, including sources of their occurrence and manifestation
"Administrative barriers were defined as special limitations to further development of business processes, which is associated with a low level of efficiency of the functioning of the public administration system in partnership with small private enterprises and individual entrepreneurs"	(Pliev, 2016)	The link between barriers and poor public administration performance is pointed out, which requires attention to management problems; Specific implications for business processes are emphasized, which is important for practical application	The focus is on the low level of efficiency, the criteria for which are not specified, which makes its consideration more subjective

End of Table 1

Definition	Author(s), year	Advantages of the definition	Limitations of the definition
Neither the term nor the definition uses the category of "growth" and similar ones			
"Administrative barriers are rules established by decisions of state authorities, compliance with which is a mandatory condition for conducting activities on the market, imposing payments for passing bureaucratic procedures, which are usually not received by the budget"	(Auzan, Kryuchkova, 2001)	The definition contains a broad generalizing characteristic, which is narrowed down by a feature (mandatory condition); the way in which the consequences appear and the result of their activity is specified	The definition gives limited representation of the ways in which the barrier occurs; other consequences, such as time costs, are ignored
"Administrative barriers are actions of executive authorities expressed in the form of adoption of regulatory, administrative documents contrary to the current legislation and regulations of the Russian Federation, as well as related to the abuse and excess of their authority in their control and supervision of the activities of business entities"	RF Government Resolution, 2005*	The definition is characterized by high legal precision; abuses and excesses of authority in control and supervision are described; contradiction with the current legislation is pointed out, which strengthens the understanding of the problem	Systemic barriers caused not by contradictions in legislation and illegal actions, but by unnecessary regulation are excluded; Legislative bodies are not identified as the source of barriers
"Administrative barriers are obstacles placed by the state in front of organizations, making it difficult for them to operate and not leading to improvements in the functioning of the state"	(Manushin, 2014)	Two types of consequences of barriers are cited: 1) hindering business operations; 2) impairing government functioning	Barriers caused by ill-considered policies and officials are not considered
"Administrative barriers in the economy – formal mandatory rules for conducting business activities in the markets of goods (services) established by state and local authorities, the private costs of introduction of which for the economic entity subject to them exceed the private benefits of their introduction, taking into account the income effect".	(Potii, 2018)	The financial impact of barriers is given as a ratio of costs that exceed benefits; both state and local governments are taken into account; the definition emphasizes the formal nature of the ways in which barriers arise	The focus is on the financial consequences and other negative effects are not taken into account; it is not clear whether the sum of all costs is included or only certain (large) costs that exceed the benefits.

* On the procedure for the development and approval of administrative regulations for the performance of state functions and administrative regulations for the provision of state services: RF Government Resolution 679, dated November 11, 2005. Available at: http://www.consultant.ru/document/cons_doc_LAW_56460 (accessed: June 31, 2024).
Source: own compilation.

regardless of whether it concerns a micro, small or medium business. The term "administrative barrier to growth" requires definition and standardization in scientific and applied research, so we conducted a special content analysis of the definitions presented above to identify the most significant provisions and develop our own definition that allows taking into account the most complete list of elements describing the barrier *(Fig. 1)*.

Figure 1. Content analysis of concepts close to the term "administrative barrier to the growth" for SMEs

Source: own compilation.

The existing theoretical provisions defining the barriers are applied as initial ones. We propose to expand the conceptual and terminological framework with our own term "administrative barriers to growth". Administrative barriers to the growth of small and medium enterprises are external obstacles created by regulatory, administrative documents of public authorities and actions of officials, expressed in mandatory rules, procedures, payments and other obligations, which cause additional financial, time and other costs in entrepreneurial activity, complicate the creation, functioning and development of the subject and reduce its efficiency, including the transition to larger categories of business, the negative impact of the administrative barriers to growth of small and medium enterprises. Unlike existing concepts, our interpretation reflects the key role of business growth, which is negatively affected by the effects of the barrier. Also, all the main elements of the barrier description are reflected simultaneously, including the generic concept, which is further clarified by several sources, ways of occurrence and manifestation of the barrier, subjects experiencing the effect of the barrier (their status and features of the period of functioning), consequences of the existence of the barrier for the subjects and higher systems. The advantage of such a definition is the systemic approach, which allows taking into account the maximum number of various administrative barriers to growth and identify them more accurately, but not to mix them with internal barriers related to the entrepreneur's own readiness for growth.

The completeness and depth of the review of publications allows concluding that the article is aimed at a topical area that has been insufficiently explored in the international and Russian scientific literature. The problematic is relatively new and there is a certain gap of scientific knowledge. Despite the gradual growth of interest in this topic, the above-mentioned works did not distinguish growth groups of microenterprises depending on their proximity to the barrier, and even less their empirical assessment in the sectoral and regional context in Russia.

Methods and materials

There are methodological limitations of research on this topic. Qualitative growth, as well as other important advantages of microenterprises, is on the periphery of official statistics and research (Serova, Churakova, 2017). To overcome the limitations, the systems approach is used as a methodological basis of the research, which allows identifying, analyzing, classifying the barriers of growing microenterprises.

With regard to small enterprises, some researchers have distinguished size groups on the border of small and medium businesses. For example, in the study of the Foundation "Small Business Resource Center" from 2010, when the limit on revenue of 400 million rubles was legally established for small businesses, the authors applied the following border zones: up to 40 million rubles, from 40 to 60 million rubles, from 60 to 100 million rubles, from 100 to 200 million rubles, from 200 to 400 million rubles and from 400 million rubles[14]. In another paper with regard to the border zone between SMEs and "non-SMEs", a similar criterion established by the state, but between medium and large businesses – 2 billion rubles (Blokhin, Glukhov, 2024). Therefore, the application of the legally established limit on revenue is tested and justified.

Based on the existing theoretical and methodological provisions, as well as economic practice, we propose as a barrier to the growth of micro-

[14] Growing SMEs in Russia and abroad: role and place in the economy (2010). Moscow: Foundation Small Business Resource Center. 63p. NISSE. Available at: https://nisse.ru/articles/details.php?ELEMENT_ID=129340 (accessed: January 23, 2024).

enterprises to analyze the boundary on the size of revenue used by the state to separate micro- and small enterprises (in recent years, it was 120 million rubles[15]).

We have developed the following typology of microenterprise growth groups on the basis of overcoming the barrier of transition to small business. In our approach in relation to the threshold value separating micro- and small enterprises, microenterprises can be conditionally divided into the following groups:

1) not approaching the growth barrier: the microenterprise's revenue was less than 100 million rubles during all five annual evaluation periods;

2) approaching the growth barrier: the value of revenue has passed 100 million rubles, but did not reach the threshold of 120 million rubles in one of the periods taken into account;

3) close to the barrier: when the amount of revenue tends to a threshold value (revenue was above 120 million rubles in one or two periods, rather than in three periods as required by law);

4) overcame the growth barrier: a microenterprise officially changed its category to a small enterprise (according to the SME register), i.e. its revenue exceeded the threshold of 120 million rubles "within three calendar years following one another" during three consecutive calendar years"[16].

To understand the magnitude of the problem and to establish the number of enterprises actually facing the growth barrier, we attempted to identify them into these four groups.

It is also of scientific and applied interest to reveal sectoral differences, i.e. which types of microenterprises are more likely to overcome the growth barrier. According to the state development institute (SME Corporation), "in 2021 the best dynamics of transitions from micro- to small and medium businesses were shown by catering, food delivery and construction, in 2022 the most active were enterprises in trade and restaurant sector"[17].

Based on this information, the following hypotheses are formulated, which are important to test for validity:

– hypothesis 1: an increased share of microenterprises overcoming the growth barrier (moving to the category of "small enterprise" or "medium") is characteristic of the OKVED (Russian National Classifier of Types of Economic Activity) sector "activities of hotels and catering enterprises";

– hypothesis 2: an increased share of microenterprises that overcome the growth barrier (move to the category of "small enterprise" or "medium") is characteristic of the activity type "construction";

– hypothesis 3: an increased share of microenterprises overcoming the growth barrier (moving to the category of "small enterprise" or "medium") is characteristic of the activity type "wholesale and retail trade";

– hypothesis 4 (additional): an increased share of microenterprises slowing down before the growth barrier is characteristic of the activity type "wholesale and retail trade";

– hypothesis 5 (additional): an increased share of microenterprises that overcome the growth barrier (move to the category of "small enterprise" or "medium enterprises") is characteristic of the activity type "manufacturing industries".

Bivariate data analysis, including correlation analysis, was used to test hypotheses. To determine the significance of differences, Student's t-criterion with correction was calculated – the Benjamini – Hochberg method (Narkevich et al., 2020).

[15] On the limit values of income received from entrepreneurial activity for each category of small and medium businesses: Government Resolution 265, dated April 4, 2016. Available at: https://www.consultant.ru/document/cons_doc_LAW_196415/#dst100005 (accessed: January 17, 2024).

[16] On the development of small and medium enterprises in the Russian Federation: Federal Law 209-FZ, dated July 24, 2007. Available at: https://www.consultant.ru/document/cons_doc_LAW_52144/08b3ecbcdc9a360ad1dc314150a6328886703356/ (accessed: February 19, 2024).

[17] Demographics of small and medium enterprises. Available at: https://corpmsp.ru/pres_slujba/news/demografiya_malogo_i_srednego_predprinimatelstva/ (accessed: February 1, 2024).

The object of the assessment was microenterprises operating in the period 2018–2022 in 84 regions of Russia[18], including the NWFD regions, in a wide range of economic sectors (24 sectors of OKVED 2).

The validity of the research results was achieved by using a combination of information sources (databases: SPARK service, SME Register from the Federal Tax Service (FTS), Rosstat, etc.). Information from the SPARK database is traditionally used to analyze, among other things, the growth of Russian enterprises (Spitsyn et al., 2023; Blokhin, Glukhov, 2024)[19]. It includes state and other data of tax and financial statements of 13 million legal entities (large, medium, small, including microenterprises).

The process of obtaining data from SPARK service included selection of indicators: "Region of registration", "Type of activity/industry", "Income"[20], "SPARK registers", etc. We selected the entire available time series (from 2018 to 2022). The convenience of this database is that all indicators are given in the context of each company for the specified years. To exclude the smallest business entities, the increased growth of which is caused by the effect of a "low base" for the "Income" indicator, we specified a minimum value (at least 40 million rubles). A similar boundary is also used in one of the studies[21]. The maximum value at the beginning of the assessment period (2018) is no more than 120 million rubles. We carried out 121 data uploads from the service, which were then formed into a single database.

We carried out preparation and primary processing, quality check and assessment of data representativeness and other activities. After unloading the database, we formed a sample of microenterprises on its basis to meet the objectives of the study:

– excluded enterprises that, according to the legislation, are not recognized by the state as SMEs; limited inclusion in the sample of enterprises whose growth was ensured not by their own efforts, but by belonging to the state[22];

– priority study of microenterprises: the sample included enterprises that met the following requirements: a) the appropriate values for the amount of revenue (specified above) were set during uploading; b) according to the Federal Tax Service, the entity was a microenterprise as of 2018, i.e. there was a corresponding entry in the SME Register; c) the enterprise had no more than 15 employees in 2018;

– microenterprises, for which analysis is impossible due to the lack of necessary data (empty values[23] characterizing revenue for 5 years), were excluded from the sample.

As a result, the study sample included 63,674 microenterprises from 84 Russia's regions. Comparison of official statistics data from Rosstat[24] and our own sample showed their high identity

[18] Excluding new regions, as in 2022 the data on them were not yet reflected in the official statistics and database. The Nenets Autonomous Area is included in the Arkhangelsk Region.

[19] "Gazelles" of transformation: results of the next annual survey of Russian high-growth companies. *SPARK information resource*. Available at: https://spark-interfax.ru/articles/ezhegodnyj-obzor-rossijskih-bystrorastushchih-kompanij-2023 (accessed: January 17, 2024); RBC Rating: 50 Fastest Growing Companies in Russia 2021. AO "ROSBIZNESKONSALTING". Available at: https://trends.rbc.ru/trends/innovation/61c098129a79471217496cd1?from=copy (accessed: February 5, 2024).

[20] In this case, the state and the database actually use revenue values rather than income values. Source: On the limit values of income received from entrepreneurial activity for each category of small and medium businesses: Government Resolution 265, dated April 4, 2016. Available at: https://www.consultant.ru/document/cons_doc_LAW_196415/#dst100005 (accessed: January 17, 2024).

[21] Growing SMEs in Russia and abroad: role and place in the economy (2010). Moscow: Foundation Small Business Resource Center. 63p. NISSE. Available at: https://nisse.ru/articles/details.php?ELEMENT_ID=129340 (accessed: January 23, 2024).

[22] *Success of SMEs in Russia* (2016). Moscow: Pero. 212 p.

[23] Ibidem.

[24] Results of the continuous monitoring of the activities of small and medium enterprises in 2020. *Federal State Statistics Service*. Available at: https://rosstat.gov.ru/small_business_2020 (accessed: February 22, 2024).

(the correlation coefficient is 0.9816). Such high comparability allows reasonably using own sample of enterprises, applying its main advantage – the availability of a wide set of data for each microenterprise. We performed sample preparation and calculations using MS Excel tools and Vortex10 software for collection, processing and analysis[25].

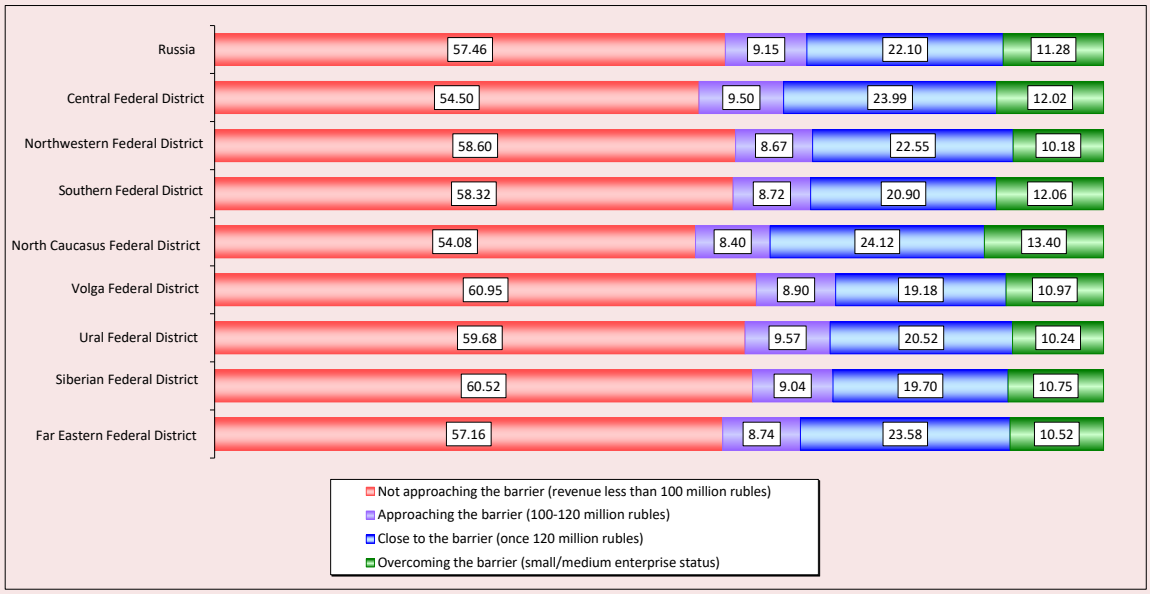
Main results of the research

In the course of the work, we empirically tested the previously logically distinguished groups of microenterprise growth. Overall, our data shows that 7,307 entities, or 11.48% of those surveyed, overcame the first barrier and grew to the category of "small enterprise" in Russia over 5 years. Only 36 of them, or 0.06%, managed to overcome two barriers and become a medium enterprise. According to the Ministry of Economic Development of the Russian Federation, only 3% of microenterprises from all SMEs moved to the category of "small enterprise". The difference between the value found and the official estimate is explained by the features of the database (lack of financial indicators for some microenterprises) and the specifics of the study sample, including the exclusion of those who closed their business and actually do not operate (one-day firms). State data were based on all nominally registered microenterprises.

The above sample for Russia as a whole, federal districts and regions was used to check the presence and prevalence of four groups of microenterprises: those not approaching, approaching, close to the barrier and overcoming it, including in the context of different sectors of the economy *(Fig. 2)*.

The best values of overcoming barriers to growth were demonstrated by the regions of the North Caucasus Federal District. Their microenterprises moved to the category of small business by 2.12% more often. The Southern (0.78% more than in the Russian Federation as a whole) and Central (0.74% more than in the Russian Federation as a whole)

Figure 2. Share of microenterprises by growth group, % of total number of microenterprises in the sample



Source: own compilation.

[25] Vortex10. Available at: https://www.vortex10.ru/about/разработка (accessed: August 22, 2024).

federal districts were slightly better than the national average; the Volga (-0.31% less), Siberian (-0.53% less) and Far Eastern (-0.76% less) federal districts were slightly worse than the national average. The Ural (-1.04% behind the RF) and Northwestern federal districts (by -1.10%) demonstrated the lowest indicator of overcoming the growth barriers. The lower values in the Northwestern Federal District are explained by the low share of overcoming growth barriers by microenterprises in construction (8.46% vs 9.54% in the RF) and agriculture (3.33% vs 12.41% in the RF).

Let us compare the sectors by the frequency of overcoming the growth barrier by microenterprises[26]. In general, we found that for Russia, microenterprises from the OKVED sector "Water supply; wastewater disposal" have an increased (statistically significant) ability to overcome growth barriers (20.31% vs 11.28% for all types of activities, i.e. almost twice as much; *Tab. 2*).

Table 2. Share of RF microenterprises by growth group by industry, % of the total number of microenterprises in the sample

Type of economic activity (OKVED 2)	Not approaching the barrier (revenue less than 100 million rubles)	Approaching the barrier (100–120 million rubles)	Close to the barrier (1 time 120 million rubles)	Overcoming the barrier (small/ medium enterprise status)	Total	Number of microenterprises in the sample
Water supply; wastewater disposal	49.89**	9.05	20.75	20.31*	100.0	453
Mining	47.37**	6.88	30.36*	15.38	100.0	247
Electrical energy	61.76	6.62	16.91**	14.71	100.0	272
Manufacturing industries	56.98	8.66	19.81**	14.55*	100.0	7,046
Agriculture, forestry	55.63	10.56	21.4	12.41	100.0	701
Wholesale and retail trade	54.63**	9.49	23.94*	11.94*	100.0	27,810
Information and communication	56.43	9.07	22.75	11.76	100.0	1,820
Healthcare and social services	73.10*	8.12	7.49**	11.29	100.0	788
Hotels and catering	65.18*	9.78	14.43**	10.61	100.0	1,933
Transportation and storage	60.42*	8.60	20.72**	10.26**	100.0	5,212
Building	57.67	9.01	23.78*	9.54**	100.0	9,223
Professional, scientific activities	60.62*	9.14	21.14	9.11**	100.0	3,009
Education	72.29*	10.84	8.43**	8.43	100.0	83
Administrative activities	65.04*	8.46	18.32**	8.18**	100.0	1,845
Public administration	84.62*	0.00**	7.69	7.69	100.0	13
Financing and insurance	48.16**	8.90	35.28*	7.67**	100.0	326
Real estate transactions	64.82*	8.96	18.90**	7.31**	100.0	2,243
Provision of other services	78.47*	5.74**	9.57**	6.22**	100.0	209
Culture, sport, leisure	63.72*	10.66	20.41	5.22**	100.0	441
Total	**57.46**	**9.15**	**22.10**	**11.28**	**100.0**	**63,674**

* It is significantly higher than the array as a whole.
** It is significantly lower than for the array.
Source: own compilation.

[26] To assess the significance of differences in the table as a whole (industry/growth group), we used Chi-square statistical criterion. To assess the significance of differences between cells, we used Student's t-criterion with correction (Benjamini – Hochberg method).

It is worth testing the hypotheses of the study. We calculated Student's t-criterion with correction – Benjamini – Hochberg method for this purpose (Narkevich et al., 2020).

Hypothesis 1: the increased share of microenterprises overcoming the growth (transition) barrier is characteristic of the OKVED type "activities of hotels and catering enterprises". In this area, the share of microenterprises overcoming the barrier (10.61%) was even slightly lower than the average share of microenterprises in all industries (11.28%). The difference is statistically insignificant; thus, the hypothesis was not confirmed.

Hypothesis 2: an increased share of microenterprises overcoming the growth (transition) barrier is characteristic of the activity type "building". In building, this share is statistically significantly lower than in other industries (9.54% vs 11.28% for all microenterprises). Consequently, the hypothesis is also not confirmed.

Hypothesis 3: an increased share of microenterprises overcoming the growth (transition) barrier is characteristic of the activity type "wholesale and retail trade". In trade, the share of those who coped with the barrier is approximately at the average level – 11.94% against 11.28% in general for all industries. The difference is statistically significant with an error probability of less than 0.05. The hypothesis is confirmed.

Hypothesis 4 (additional): the increased share of microenterprises slowing down before the growth barrier is characteristic of the activity type "wholesale and retail trade". In the array as a whole, 22.10% of microenterprises slowed down before the barrier, while 23.94% of subjects slowed down before the barrier, which is significantly higher in the area of trade. The hypothesis was confirmed.

Hypothesis 5 (additional): the increased share of microenterprises overcoming the growth (transition) barrier is characteristic of the activity type "manufacturing industries". The share of manufacturing microenterprises that overcame the barrier amounted to 14.55%, which is significantly higher than in the array as a whole (11.28%). The hypothesis was confirmed.

Thus, we revealed and analyzed the main groups of microenterprise growth emerging in the federal districts of Russia. We identified industries with an atypical ability to overcome growth barriers, the frequency of microenterprises' transition to a larger category clearly differs from the average values for all industries, both for the better and for the worse.

Discussion

Our own study of growth barriers based on the analysis of financial data of microenterprises is unique. No similar research has been undertaken in Russia for the smallest and most mass category of business. Only partially the obtained results can be compared with the results of studies of small and medium enterprises[27]. But they did not measure transition barriers, but only described the number of small enterprises that grew to the status of "medium enterprise". Only one study estimated transition barriers, but they are applicable only when the "boundary" layer of companies is approximately from 0.5 or 1 to the threshold of 2 billion rubles of revenue per year (Blokhin, Glukhov, 2024).

We confirmed three of the five hypotheses. The data provided by the SME Corporation on industries that have overcome the transition barrier were not confirmed, as they contain data not only for micro- and small enterprises, but also for the period 2021–2022, while in our sample, the data were estimated for a five-year period. The differences could also

[27] *Growing Small and Medium Business in Russia and Abroad: Role and Place in the Economy* (2010). Moscow: Foundation Small Business Resource Center. 63 p. NISSE. Available at: https://nisse.ru/articles/details.php?ELEMENT_ID=129340 (accessed: January 23, 2024); *Success of Small and Medium Enterprises in Russia* (2016). Moscow: Pero. 212 p.

be influenced by the previously mentioned features of the database and the specifics of the selection of the microenterprises under consideration. For the sphere of retail and wholesale trade, we found that, first, the increased share of microenterprises slows down before the growth barrier (hypothesis 4), and second, the increased share overcomes the growth barrier (hypothesis 3). Other researchers, in particular E.Yu. Litau, point out that the revenue of a trading enterprise compared to the identical revenue of a manufacturing enterprise would indicate a different scale of business (Litau, 2013). Therefore, both differences identified confirm a different scale of business in trading. In general, trade microenterprises are more likely to have a larger business size than microenterprises in other industries.

It is confirmed that microenterprises in manufacturing are significantly more likely to overcome the growth barrier than in other industries in general (hypothesis 5). This finding is consistent, in particular, with the results of the study for Indian microenterprises. The probability of long-term performance is higher for manufacturing microenterprises compared to trade, probably because manufacturing experiences less volatility (Mor et al., 2020).

When applying the obtained scientific results, we should take into account that the sample exclude microenterprises for which SPARK database does not provide financial data. The category of "individual entrepreneurs" was not studied (data on them are also missing). The sample was limited in terms of revenue (companies with revenue of 40 million rubles or more were included) to eliminate the effect of a "low base" and one-day firms.

The practical application of our tested methodological approach can consist in its ability to identify growth candidates (microenterprises capable of overcoming the transition barrier) from a large array of businesses in the region, including forecasting their development to the category of "small business" and "medium- companies". The above allows concluding that our own approach to measuring the proximity of a microenterprise to the barrier gives a result that step-by-step reflects the actual approach, slowdown or overcoming by the enterprise of the transition barrier to the next category of business. The formed new scientific approach is able to attract the attention of other researchers to the identification and search for ways to overcome the barriers of microenterprise development (previously ignored source of economic growth).

Conclusion

The results obtained can contribute to the development of theoretical science, in particular to the evolutionary theory of firm growth, by supplementing it with our unique theoretical positions, including:

– for the first time proposed definition of administrative barriers to the growth of SMEs, which allows taking into account the most complete list of characteristics, including the sources of the barrier, ways of its emergence and manifestation, subjects who feel the need to overcome the barrier (their status and peculiarity of the period of functioning), the consequences of the existence of the barrier for the subjects and economic growth;

– developed typology of microenterprise growth groups based on overcoming the barrier of transition to a larger category of business.

The tested methodology, which includes the collection, downloading and analysis of an original set of empirical data from the SPARK database, has methodological significance that can contribute to the development of applied science. It helped us to obtain the following conclusions about the transition barrier of microenterprises in Russia's regions:

– 11.48% of the microenterprises in the sample crossed the barrier and grew to the small enterprise category;

– about 31.25% of microenterprises may be hampered by the barrier of transition to the category of "small enterprise";

– microenterprises from the sectors of water supply, manufacturing, wholesale and retail trade have an increased ability to overcome growth barriers.

For the first time empirically established the number of microenterprises suffering from the barriers of transition to the category of "small enterprise", including a regional and sectoral comparison of two groups: those who failed to overcome the barrier and those who coped with it. The development of missing scientific approaches and provisions on the urgent and rapidly affecting the business environment and economic growth of the problem indicates the scientific novelty of the study of microenterprises.

The practical significance of the research lies in the obtained scientific knowledge, which was missing earlier, necessary for public and state awareness of the importance of development and special support for growing microenterprises in order to achieve sustainable economic growth. The methodological approach is able to establish proximity to the growth barrier for a wide range of microenterprises in industries and regions of Russia.

In further research, it is necessary to supplement the considered administrative barriers to growth with a description of barriers of a different nature, for example, psychological attitudes of entrepreneurs regarding the necessity and possibility of further business growth. It seems important to propose and substantiate internal (in particular, cognitive) growth barriers related to the entrepreneur's readiness for growth, as well as to assess their consequences, including sociological methods, within the framework of the strategic theory of company growth.

It is necessary to further develop science-based prerequisites for the process of transformation (transition) of microenterprises into small businesses through the transformation of the business environment. The identified prerequisites and system conditions for the growth of microenterprises and overcoming barriers should be the basis for the emerging policy of supporting the priority category of growing business as a source of economic growth.

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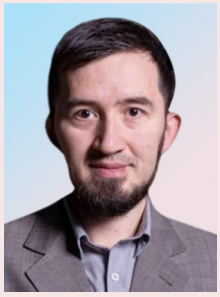
Assessing the Impact of Artificial Intelligence on Russian Labor Market Development Scenarios: Industry Analysis



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Abstract. Artificial intelligence has become an essential element of technological progress, while generative artificial intelligence occupies a special place as an innovative general-purpose technology. Given the rapid development of this technology and its high potential for mass adoption in various economic sectors, it becomes important to assess the impact of this technology on the labor market. The modern Russian labor market is characterized by low unemployment, staff shortages, and intersectoral imbalances. An urgent scientific task is to model scenarios for the development of the labor market in the context of sectors, taking into account the influence of generative artificial intelligence. The aim of the work is to assess the potential impact of the mass use of generative artificial intelligence on the labor market, due to changes in labor efficiency in some professions and industries, based on the analysis of statistical and expert data and economic and mathematical modeling of possible scenarios for the development of the labor market. Economic sectors were divided into three groups depending on the rate of change in personnel needs, based on the analysis of the Beveridge curve, which shows the dependence of the level of needs on the unemployment rate. Using existing statistical data and expert assessments, we determine the degree of influence of generative artificial intelligence on labor efficiency in various industries. We put forward an approach that helps to obtain estimates of possible scenarios for the development of sectoral labor markets for the period up to 2030, based on official forecasts of ministries (Ministry of Economic Development of the Russian Federation, Ministry of Labor of the Russian Federation) for the period up to 2026, their extrapolation, and superimposition of the impact of mass use of generative artificial intelligence (as a disturbing effect). The results obtained suggest that the severity of staff shortage issue in general can be partially reduced by using generative artificial intelligence; thus, we identified industries in which (a) it is possible to address the problem of staff shortage at the current level of needs, and (b) staff shortage will persist. Modeling the migration of professions and personnel between industries seems promising, because the expected effect of mass technology adoption will not only change the balance of labor resources, but also lead to the need to re-profile some of the personnel.

Key words: general-purpose technology, generative artificial intelligence, large language models, labor market, personnel shortage, scenario modeling.

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Introduction

Automation and robotization processes are not something new to the modern economy, but automation capabilities are reaching a whole new level with the emergence of new technologies such as generative artificial intelligence (AI). These technologies make it possible to automate processes that were previously considered solely the prerogative of humans. For example, generative AI can be used to create content, not only in the form of text, but also pictures, video, and sound, which significantly expands the application horizons of automation. In the study, generative AI primarily refers to models that work with text, i.e., large language models. Generative AI has significant potential to improve performance in various fields by fundamentally changing some part of work processes and enhancing human capabilities. There are studies (Gambacorta et al., 2024) that have shown a 55% increase in programmers' productivity through the use of generative AI. If there are algorithizable, often repetitive tasks in which the risk of error is not critical, generative models can do part of the work, including creating draft texts, codes or design, analyzing a large amount of information, speeding up work processes, for example, in accounting, marketing, HR, etc.

Currently, the Russian labor market is experiencing a personnel shortage. According to Rosstat, in July 2024, the unemployment rate is at a historic low of 2.4%. There is a need to analyze the existing trends in the labor market, develop labor market development scenarios and identify factors that can reduce the negative impact of staff shortage, including through generative AI.

On the one hand, low unemployment may indicate an approach to full employment, when the country's labor resources are used to the maximum, but there is a risk of negative effects. In the absence of sufficient free labor resources in the labor market, the enterprises' development may slow down. R.I. Kapeliushnikov states that "the Russian economy will have to operate for a long time in stressful conditions of acute shortage of labor resources, which threatens to become the main brake on its sustainable growth" (Kapeliushnikov, 2024). To overcome this situation, in an attempt to compensate for labor shortages, companies may increase the workload of existing employees or have to resort to wage increases as employers compete for a limited number of employees. This will obviously increase the costs associated with hiring, training and retaining employees. In general, wage increases not only lead to inflationary pressures, but also to higher inequality of working conditions, increasing social and economic inequality. There are risks that employers may have to hire less skilled or less productive workers just to fill vacancies, which can reduce overall productivity, and many employees may become less motivated to develop professionally, knowing that they can easily find a job even without upgrading their skills. Employees may also change jobs more frequently in search of better working conditions, higher wages, or better benefits, knowing that there is a labor shortage in the labor market.

The aim of the study is to assess the potential impact of generative artificial intelligence on the labor market in the context of economic sectors

through changes in labor efficiency, based on data analysis and economic and mathematical modeling of possible scenarios of labor market development.

Literature analysis

One of the tools for analyzing the labor market is the construction of the Beveridge curve, which describes the relationship between the unemployment rate and the vacancy rate (Alekhin, 2024; Kapelyushnikov, 2024). The Beveridge curve is a tool to assess the "productive capacity" of the labor market. Maximum labor efficiency is the case when the curve is minimally distant from the origin of coordinates (Kapelyushnikov, 2024). "The Beveridge curve has become a central concept in labor market macroeconomics also because it has two advantages. First, each value of the empirical curve indicates the state the economy is in at a given point in time. Second, the empirical curve allows separating changes in the labor market system due to shocks to the activity of economic agents from its changes due to structural shocks" (Alekhin, 2024).

"When the unemployed are few and the demand for labor is high, it is difficult for employers to find additional labor, even if they increase the number of vacancies. And vice versa, when the unemployed are many and vacancies are few, each vacancy is quickly replaced, which strongly affects the unemployment rate" (Alekhin, 2024). At the same time, the analysis of the Beveridge curve, which in fact reflects the dependence of only two indicators, should not be limited to conclusions on them. Indeed, the number of actual vacancies, for example, depends not only on the needs of enterprises, but also on the speed of their closure, which in turn depends on many factors, including the level of wages, working conditions, readiness of the population to structural changes in the labor market, relocation, etc.

B.I. Alekhin highlights the following advantages of the analysis of the empirical Beveridge curve: "It is more convenient to interpret the Beveridge curve to assess the labor market conditions than to analyze two separate time series –vacancies and unemployed"; "by the points of the Beveridge curve, it is possible to determine the current state of the economy", i.e. the state of economic recession or expansion; "the Beveridge curve helps to distinguish changes in the market system of employment caused by business activity from changes caused by structural shocks". "Thus, an economy moving from recession to expansion and back again leaves a trail of dots along the trend line. Recession and unemployment are mutually reinforcing. But, as the U.S. Federal Reserve once stated, unemployment "rises like a rocket and falls like a feather" (Alekhine, 2024).

The Beveridge curve can vary across industries due to differences in labor demand, technological change, seasonal fluctuations, and institutional factors. For example, the introduction of new technologies may reduce jobs in industry but create them in the IT sector. Seasonal fluctuations particularly affect agriculture and construction. The skill level of workers and their mobility requirements also play an important role, as training time for different industries can vary widely. For example, an increase in demand for physicians and their wages may not increase their numbers if there are no unemployed physicians in the labor market. In addition, economic cycles affect industries differently: manufacturing and construction are hit hard during recessions, while health care and education are more stable. Social and demographic changes can also lead to differences (Bonthuis et al., 2016; Destefanis et al., 2020).

Researchers have applied different models and methods to assess the impact of generative AI on the labor market. Many of the methods are based on earlier studies. Generative AI is not the first technology that has led to changes in the labor market, and in choosing a methodology to assess the impact of generative AI on the labor market, researchers often rely on methodologies that have been used previously to assess changes due to other factors. It is worth noting the method based on the assessment of the possibility of automating individual tasks by their textual description and the method of analogies in terms of methods for assessing the impact of generative AI on the labor market.

Method for evaluating the automation of individual tasks by their textual description. The methodology is based on the use of verb-noun pairs describing specific labor functions. Webb (Webb, 2019) describes the application of this methodology to analyze task automation. It offers a structured approach to identifying tasks that can be automated by generative AI, including data collection, comparison with technologies, expert judgment, and calculation of automation probability.

The article "The Economics of Generative AI" (NBER) (Brynjolfsson, Li, 2024) notes that generative AI increases productivity through task automation. The paper describes the Productivity J-Curve model, showing the time lag between technology adoption and productivity growth. The authors used O*NET data and AI patents to analyze the impact of generative AI on occupations, revealing that 80% of the US workforce can be impacted by task automation through large language models such as ChatGPT-4.

Task and impact analysis methodology. The methodology assesses which tasks can be automated by AI and how this will affect occupations. The article (Eloundou et al., 2023) discusses the impact of large language models on the labor market, analyzing the impact of AI on different tasks.

Method of analogies for forecasting staffing needs and assessing the impact of AI on the labor market. The method of analogies predicts staffing needs and evaluates the impact of AI on the labor market by analyzing similar situations. Enhancing Work Productivity through Generative Artificial Intelligence: A Comprehensive Literature Review (Al Naqbi et al., 2024) examines the impact of generative AI on labor productivity using historical analogy and bibliometric analysis.

The paper "Forecasting Human Resource Needs for Artificial Intelligence in Russia" (Averyanov et al., 2023) applies the method of analogies to assess the human resource needs in the AI field. It is used to forecast future changes in the labor market based on analogies with other technological transformations.

The methods are often difficult to categorize into a single methodology. The article (Averyanov et al., 2023) applies elements of the labor balance method and the method of analogies to provide a comprehensive analysis. The labor balance method estimates the distribution of labor resources, while the analogy method predicts labor demand based on similar situations, providing conclusions about the future demand for workers in the AI industry.

The spread of any general-purpose technology, including generative AI, causes the transformation of the labor market and raises a number of issues related to its structural reorganization and changes in the ratios of labor performed by humans and performed by machines. The problem of technological unemployment emerges in a new capacity, accelerating the process of displacement of human labor in many industries (Kolade, Owoseni, 2022).

Important questions arise about the future of employment, its quality and income distribution as machines and algorithms increasingly perform tasks that were once part of human labor. The article "The Impact of Industry 4.0 and Digitalization on the Labor Market in 2030 – Confirming Keynes's Prediction" (Szabó-Szentgróti et al, 2022) notes that, on the one hand, the extent of technological unemployment will largely depend on the digitalization strategy adopted in each country, the speed of its implementation, and the readiness of the country's education system to retrain vulnerable groups of working-age population; on the other hand, the amount of necessary work tasks will decrease, bringing us closer to Keynes's concept of three working hours per day. At the same time, the reduction of working hours will increase economic efficiency through more intensive and efficient work (Gachaev et al., 2023).

Current scientific research shows that shortening the work week can bring significant benefits to employees and organizations. For example, a UK study[1] found that moving to a four-day working week led to a significant reduction in employee stress and sick days, while productivity remained the same. Therefore, employers, on the one hand, may intentionally and formally reduce the length of the working week, on the other hand, this may occur covertly. In such cases, an employer may be aware that an employee does not actually work a full 40-hour week, taking into account, for example, remote or hybrid forms of work, the use of generative AI, but he or she agrees to it, forming a loyal attitude of the employee to themselves and ensuring the fulfillment of necessary work tasks. In this context, the use of generative AI opens up a wide range of opportunities to improve the quality of life, but becomes an inevitable element of competition by reducing marginal costs (Sulumov, 2022).

A number of researchers also note that the spread of generative AI will necessitate the creation of new professions and new jobs, the number of which may be comparable or greater than the number of jobs in which humans will be replaced by machines in the digital transformation of the economy (Panetta, 2017).

Analysis of the current state of generative AI utilization shows that the possible options for the potential impact of generative AI can be summarized into the following development scenarios:

1) reduction in working hours or workweek by increasing labor productivity with generative AI (Gupta et al., 2024; Ellingrud et al., 2023);

2) unemployment increase in the short term; decrease in the number of jobs due to the ability of generative AI to replace some labor functions (Autor, 2022; Haapanala et al., 2023; Brynjolfsson et al., 2023);

3) employment growth in the long term due to the impact of generative AI potential on economic growth; economic growth in turn will be associated with the development and implementation of modern technologies, and possible negative effects will be overlapped with positive ones (Broecke, 2023; Kalish et al., 2023; Al Naqbi et al., 2024).

At the same time, all researchers, despite which scenarios they consider more likely, note the presence of trends toward changes in professional competencies and labor functions, because some of them will be replaced by modern technologies, and some will require development, to a greater or lesser extent, depending on the field of activity. One way or another, there will be a change in the balance of labor resources.

[1] University of Cambridge. Working a four-day week boosts employee wellbeing while preserving productivity, major six-month trial finds. ScienceDaily, 21 February 2023. Available at: https://www.sciencedaily.com/releases/2023/02/230221113132.htm

Despite the literature on the impact of automation on the labor market in Russia (Gimpelson, Kapeliushnikov, 2022; Kapeliushnikov, 2024), there are no works on assessing the impact of generative AI, automation is considered as "replacement of labor by machines or artificial intelligence with the elimination of relevant jobs" and "in the foreseeable future is unlikely to be realized" (Gimpelson, 2022). In our study, however, generative AI is considered not as a tool for replacing human labor, but as a tool for increasing the labor efficiency (productivity). Automation, according to the estimates of V.E. Gimpelson and R.I. Kapeliushnikov, will affect about 10% of the employed: "Calculations show that the total share of jobs where routine operations prevail is small and amounts to a little more than 10%" (Gimpelson, Kapeliushnikov, 2022), while in our study the estimates of the impact of technology on individual industries (e.g., IT) reach 50%, and the average for the economy is 23%.

The increase in labor productivity due to the mass introduction of generative AI technology is only one of the factors affecting the labor market development. Our study only indirectly takes into account all factors (demography, migration policy, geopolitical situation, state of the economy, labor productivity, share of wages in GDP and others), by using the official forecasts of the Ministry of Labor and Ministry of Economic Development, taken as an inertial scenario.

Methodology of the research

The research methodology is based on our approach to assessing the generative impact AI on the staff shortage and gross domestic product (GDP) in various economy's sectors *(Fig. 1)*. The following tasks can be considered as the enlarged stages of the research:

1) assessment of the current state of the labor market (staff shortage) through the construction of the Beveridge curves; for the study, we used Rosstat data on output, employment, personnel needs and unemployment rates;

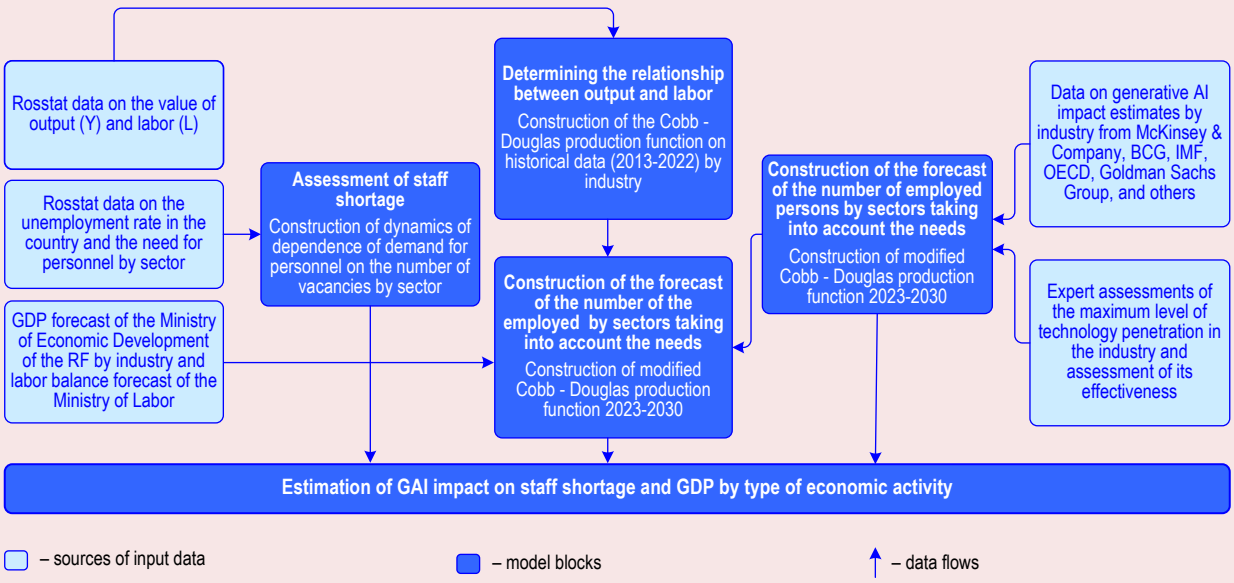
2) construction of an econometric model of the relationship between output and labor values based on statistical data for the period 2017–2022;

3) construction of dependence up to 2027 based on official GDP forecasts provided by the Ministry of Economic Development and labor balance forecasts from the Ministry of Labor, and then extrapolation of the inertial forecast up to 2030;

4) assessment of the impact of generative AI on labor productivity based on estimates of the possible increase in labor productivity, taking into account different levels of technology penetration (share of users from the number of employees) in the industry and different efficiency of the technology. It means that the approach of Acemoglu, Restrepo (Acemoglu, Restrepo, 2018) is applied, where it is considered that there is a part of labor resources (a)whose efficiency can be improved by an amount (k), and then the number of employed L by efficiency works as $L^*=akL+(1-a)L$. Estimates of the generative AI impact on labor productivity and the economy are taken from reports of such sources as IMF, OECD, McKinsey & Company, BCG, etc., which are supplemented by expert scenarios using simulation-expert modeling[2], when existing trends in the development of sustainable indicators on the basis of a computational simulation model are iteratively adjusted with the help of expert estimates.

[2] Ototskii P.L. (2008). Mathematical model of the socio-economic system of the region taking into account external disturbing influences: specialty "Mathematical modeling, numerical methods and program complexes": Candidate of Sciences (Physics and Mathematsl) thesis. Moscow. 132 p.

Figure 1. Model Architecture



The research (Alekhin, 2024; Kapeliushnikov, 2024) uses the Beveridge curve to analyze the relationship between the unemployment rate and the number of vacancies, which shows the inverse relationship between the unemployment rate and the number of vacancies and helps to understand the labor market state. The article "Expansion of Vacant Jobs in the Russian Labor Market: Dynamics, Composition, Triggers" (Kapeliushnikov, 2024) notes that during the last few years the unsatisfied demand for labor force reached a record high by the standards of the Russian labor market, which caused the Beveridge curve to shift sharply upward.

We used Rosstat data on the dynamics of the unemployment rate and staffing needs by industry to assess the staff shortage. The obtained functions of dependence between the unemployment rate and the number of vacancies by industries allow comparing industries in terms of the dynamics of personnel needs.

Low unemployment indicates high demand for labor and staff shortage, which creates difficulties for employers in hiring qualified workers. Under such conditions, employers are forced to look for alternative solutions to maintain production levels and meet market demands. One such solution is to replace human labor with technology.

The Cobb – Douglas function can be used to analyze production processes and estimate the contribution of labor and capital to economic output. In the context of labor shortages and low unemployment, employers are increasingly turning to technology to compensate for labor shortages. To more accurately account for the current factors affecting productivity, we propose to modify the Cobb – Douglas function by adding an automation factor associated with the introduction of generative AI, which makes it possible to account for the impact of new technologies on output. This is especially important in a rapidly changing labor

market, where generative AI can significantly reduce the dependence of output on the number of workers and increase overall production efficiency. When moving from a classical production function to a modified one that allows taking into account the impact of generative AI on different industries, there is a need to quantify the degree of technology penetration in the industry (what percentage of those employed in the industry will use it) and to estimate the labor efficiency improvement indicator (how much labor productivity will increase).

When forming the inertial forecast, we used official forecasts of ministries (Ministry of Economic Development of the RF, Ministry of Labor of the RF) up to 2026; then we extrapolated the forecasts and superimposed the assessment of changes in the inertial scenario under the influence of generative AI technology (as a perturbing influence): "Forecast of long-term socio-economic development of the Russian Federation for the period until 2030" and the current forecast of socio-economic development of the Russian Federation for 2024 and for the planning period of 2025 and 2026 of the Ministry of Economic Development of the RF, the latter of which is updated annually, forecasts of the Ministry of Labor of the RF, in particular "Forecast of the balance of labor resources for 2024–2026". The Ministry of Economic Development provides not only forecast scenarios (baseline and conservative) for the main macroeconomic indicators, including GDP, investment in fixed capital, etc., but also forecasts for the structure of GDP by sector.

Based on the estimates of the degree of technology penetration in the industry and the labor efficiency improvement indicator, we can determine the degree of influence of generative AI on the labor market for each of the industries. There arises the possibility of using a scenario approach and parametric simulation modeling, when in the described system we can estimate the necessary level of technology penetration to obtain a certain specified effect, or, conversely, estimate the possible effect taking into account the assumptions about the level of technology penetration, as well as model several scenarios by varying the values of the mentioned values as a parameter. As a result, scenarios of labor market changes will be proposed taking into account the application of generative AI technology, including changes in the number of vacancies, based on data analysis and economic and mathematical modeling of possible labor market development scenarios.

Assessment of labor shortage

The analysis of the ratio of supply and demand in the labor market through the indicators of the need for personnel (number of vacancies) by sectors and the unemployment rate indicates personnel shortage. Indeed, the decrease in the unemployment rate and the increase in the demand for personnel led to the fact that the level of demand exceeded the unemployment rate, and in a number of industries more than 3 times, while "in most developed countries the equilibrium ratio of vacancies to unemployment is in the range of 0.7–1.0"[3], i.e. the number of vacancies does not exceed the unemployment rate. That is, the number of vacancies does not exceed the unemployment rate. "Values consistently exceeding this range indicate structural imbalances in the labor market"[4]. We consider the dynamics of indicators (from the first quarter of 2022 to the second quarter of 2024) to analyze trends, construct the Beveridge curve for each of the industries. *Figure 2* shows the Beveridge curve for total demand by A-S industries,

[3] OECD Employment Outlook 2022: Building Back More Inclusive Labour Markets. OECD Publishing, Paris.

[4] Ibidem.

Figure 2. Beveridge curve for aggregate data

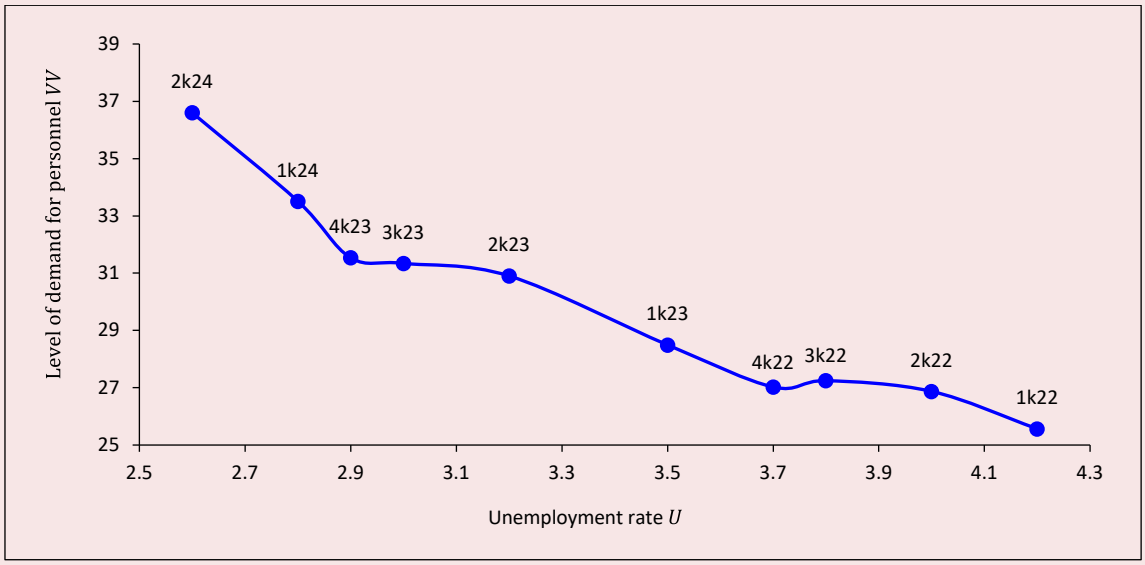
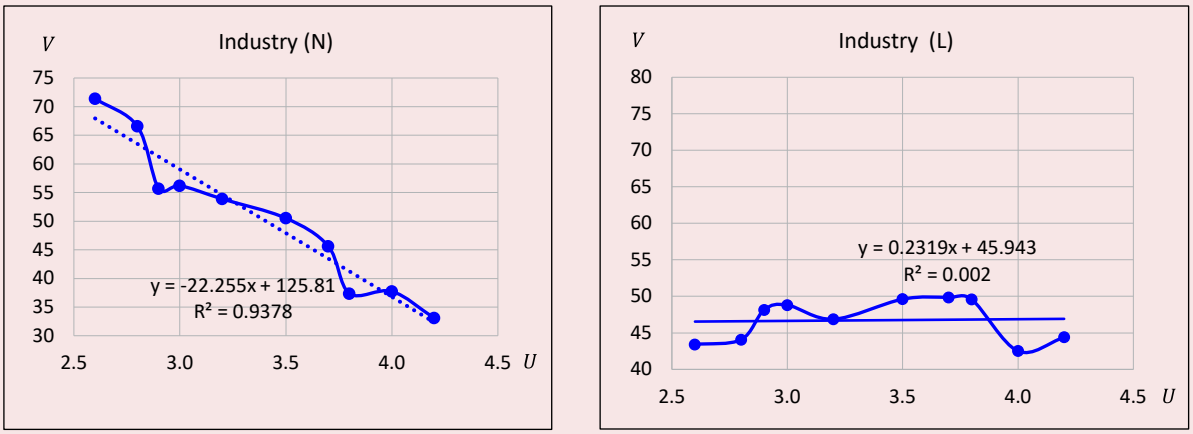


Figure 3. Beveridge curves for industries N (left) and L (right)



and *Figure 3* gives examples of industries with different rates of change in demand: industry (N) (administrative and related additional services) as an example of an industry where the unemployment growth led to a multiple increase in the level of demand for human resources (more than 2 times), and industry (L) (real estate activities) as an example of an industry where the growth of demand was not observed. For calculation we used official data of Rosstat on unemployment rates in % and levels of demand for personnel, V – number of vacancies per 1,000 employed (we used the ratio of the number of required employees on the list for vacant jobs at the end of the reporting quarter to the number of employed in the industry according to Rosstat data). We made calculations for 10 quarters, from the first quarter of 2022 to the second quarter of 2024.

Table 1 presents the computational results, obtained by the least squares method to estimate the formula coefficients:

$$V = b_0 + b_1 \cdot U,$$

where V is the industry's demand for personnel,
U is the unemployment rate,
b_0, b_1 are unknown coefficients.

Thus, the ranking of industries depending on the rate of change in human resources needs (based on the Beveridge curves) allowed identifying industries with high growth rates of human resources needs. These industries are most affected by changes in labor productivity, which makes them the most promising for the introduction of generative AI. However, it is important to keep in mind that the speed of technology adoption will be determined by both industry demand and the technical capabilities of generative AI to improve labor productivity. For example, in industries with a high proportion of routine tasks, such as finance or IT, generative AI can improve labor productivity faster than in industries with low automation, such as agriculture. Ranking industries by the rate of change in labor needs allows the government to better design and implement policies on employment, education, and technological development. This helps to focus efforts on those sectors where the shortage of human resources is most critical and where the introduction of technologies such as generative AI can have the maximum effect. For a more accurate assessment of the impact of generative AI on labor productivity, it is necessary to build a forecast of labor market development taking into account the peculiarities of each industry.

Building an inertial forecast of the labor market development

The apparatus of production functions is usually used to assess the potential for technology impact (Jones, 2016; Vavilova, Rayan, 2024).

$$Y = AK^{\alpha}L^{\beta}$$

Table 1. Ranking of industries depending on the rate of change in personnel needs changes in human resources needs

Description of industry group	Industry	Coefficient b_1
A 0.1% increase in unemployment led to a 0.9% or more increase in the need rate	Water supply; wastewater disposal, organization of waste collection and utilization, pollution elimination activities (E)	-24.205
	Administrative activities and related ancillary services (N)	-22.255
	Manufacturing industries (C)	-10.88
	Provision of electricity, gas and steam; air conditioning (D)	-10.497
	Wholesale and retail trade; repair of motor vehicles and motorcycles (G)	-9.3103
A 0.1% increase in unemployment led to a 0.1–0.9% increase in the need rate	Public administration and military security; social security (O)	-6.6452
	Mining and quarrying (B)	-5.0797
	Agriculture, forestry, hunting, fishing and fish farming (A)	-5.067
	Transportation and storage (H)	-4.8209
	Building (F)	-4.3137
	Education (P)	-2.6172
	Information and communication activities (J)	-2.5889
	Professional, scientific and technical activities (M)	-1.9203
	Activities in the field of culture, sport, leisure and entertainment (R)	-1.571
	Activities of hotels and catering companies (I)	-1.2212
The increase in need is minimal, a 0.1% increase in unemployment resulted in a less than 0.1% increase in the level of need	Provision of other services (S)	-0.6985
	Health and social services activities (Q)	-0.4052
	Real estate activities (L)	0.2319
	Financial and insurance activities (K)	1.3308

The construction of the Cobb – Douglas function in the context industries allows taking into account the specifics of industries. The classical approach faces the problem of data endogeneity, when capital and labor are correlated with the model error, which leads to biased estimates. This can be caused by several reasons, the main ones being correlation between capital and labor or non-stationarity of the data, presence of unaccounted feedbacks, e.g. not only output grows from the value of capital but also capital grows from the value of output, measurement errors, etc. Construction of inertial forecast of the labor market development. For example, calculations of the coefficients of the equation $Y = AK^{\alpha}L^{\beta}$ for the industry "real estate activities" showed a negative degree of β (when the number of employees decreased and gross value added increased), and when imposing the constraint $\alpha + \beta = 1$, which is usually interpreted as a condition of constant returns to scale, $\beta = 0$. This result may lead to false conclusions about the independence of output from employment or about the presence of an inverse relationship. Similar results for other industries are associated with the effect of multicollinearity, endogeneity, and sometimes with low variability of the number of employees. Construction of inertial forecast of the labor market development. The values of labor and capital in economic data are often difficult to use in their original form because they are non-stationary and endogenous with respect to the model. This means that their levels can change over time due to factors such as economic growth, investment, demographic change and technological innovation. Typically, capital and labor indicators have trends, making their time series non-stationary. To use the data correctly, econometric modeling often employs techniques such as cointegration checks and transformation of the data (e.g., differences) to make them stationary.

A constraint is often imposed: the sum of degrees in the Cobb – Douglas function is equal to one $\alpha + \beta = 1$. This is usually interpreted as a condition of constant returns to scale. This study has shown that it is possible to improve the quality of the estimates of the Cobb – Douglas function by using an approach where both parts of the equation are divided by the value of the number of people employed (Jones, 2016). In essence, this approach allows study labor productivity (in the sense of the ratio of output to employment), excluding the impact of the total number of workers and focusing on the returns to capital and technology.

$$\frac{Y}{L} = \frac{AK^{\alpha}L^{1-\alpha}}{L} = \frac{AK^{\alpha}}{L^{\alpha}} = A(\frac{K}{L})^{\alpha}$$

It is revealed how this indicator depends on time based on the statistical analysis of the dynamics of the ratio $\frac{Y}{L} = f(t)$. *Figure 4* shows an example of plotting the graph for the industry (C) "Manufacturing". Given this, we can use this property of the function to forecast the ratio in future periods by selecting the coefficients of the function $P = f(t)$ on the known data and then extrapolating the values.

In our case, the estimation was made on the data from 2017 to 2022. The values of gross value added (GVA) by industry (in 2021 prices) were used as the value of output Y by industry, and the value of labor resources L – the number of employed persons by economic activity. Thus, using the method of least squares we obtain equations for the inertial forecast of $\frac{Y}{L}$ values for all industries with appropriate values of model quality (coefficients of determination R^2) (*Tab. 2*) and the possibility to use one of the variables as a parameter for scenario modeling of the second variable, i.e. to have estimates of output values depending on the estimated values of the number of employees and vice versa.

$$Y = PL$$

Figure 4. Graph of $\frac{Y}{L}$ ratio by industry (C) “Manufacturing”

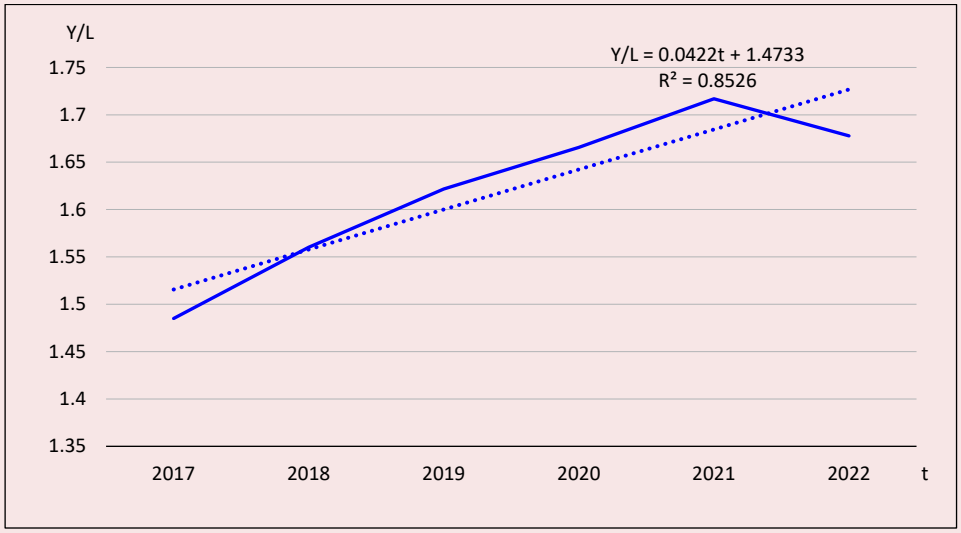


Table 2. Equations of dynamics of Y/L ratio

Industry	Equation	Coefficient of determination R^2
Agriculture, forestry (A)	Y/L = 0.0554t + 0.9373	R^2 = 0.9833
Mining and quarrying (B)	Y/L = -0.1214t + 14.369	R^2 = 0.4538
Manufacturing industries (C)	Y/L = 0.0422t + 1.4733	R^2 = 0.8526
Provision of electricity, gas and steam; air conditioning (D)	Y/L = 0.1155t + 1.2858	R^2 = 0.8908
Водоснабжение; водоотведение, организация сбора и утилизации отходов (E)	Y/L = 0.0273t + 0.7042	R^2 = 0.8469
Building (F)	Y/L = 0.0058t + 0.8899	R^2 = 0.2528
Wholesale and retail trade; repair of motor vehicles and motorcycles (G)	Y/L = 0.0008t + 1.1428	R^2 = 0.0008
Transportation and storage (H)	Y/L = -0.0307t + 1.4976	R^2 = 0.5827
Activities of hotels and catering companies (I)	Y/L = -0.0087t + 0.5974	R^2 = 0.0935
Information and communication activities (J)	Y/L = 0.0721t + 1.7986	R^2 = 0.8782
Financial and insurance activities (K)	Y/L = 0.488t + 2.3556	R^2 = 0.9754
Real estate activities (L)	Y/L = 0.1601t + 5.852	R^2 = 0.9693
Professional, scientific and technical activities (M)	Y/L = 0.0704t + 1.5051	R^2 = 0.9317
Administrative activities and related ancillary services (N)	Y/L = -0.0271t + 1.4079	R^2 = 0.6924
Public administration and military security; social security (O)	Y/L = 0.0813t + 1.9488	R^2 = 0.8192
Education (P)	Y/L = 0.0025t + 0.6841	R^2 = 0.2058
Health and social services activities (Q)	Y/L = 0.0198t + 0.8399	R^2 = 0.5891
Activities in the field of culture, sport, leisure and entertainment (R)	Y/L = 0.0283t + 0.8703	R^2 = 0.5452
Provision of other services (S)	Y/L = 0.0056t + 0.343	R^2 = 0.3488

The use of the proposed approach allowed obtaining equations with high coefficients of determination (more than 0.8) for most industries. Low values of the coefficients of determination (less than 0.5) were obtained only in such industries as construction (as an industry sensitive to changes in the economy), as well as in industries affected by the coronavirus pandemic (trade, hotels and catering, and education) and which are highly dependent on external factors (mining).

Building a forecast of labor market development taking into account the impact of generative AI technology

Next, we focus on the assessment of changes in output indicators under the impact of the introduction of generative AI technology, taking into account the need to analyze the existing cause-and-effect relationships. It is obvious that if generative AI is able to automate some labor functions, then first of all it is necessary to determine the impact of the technology on labor productivity. The need arises to introduce the concept of "effective number of employees" or "effective number of employees". If the efficiency of an employee grows by 1+ k times, then we will say that k is a parameter that shows the level of efficiency (productivity) increase due to the use of generative AI and the new total productivity of the same number of employees, increased only due to generative AI, will be called the effective number of employees. The degree of penetration of the technology should also be taken into account. The efficiency will definitely vary from industry to industry, since different industries have different numbers of tasks that will be affected by generative AI (Ototskii, Pospelova, 2024).

In the article "Artificial Intelligence, Automation, and Work" (Acemoglu, Restrepo, 2018), the authors use the following classical production function, dividing labor into automatable and non-automatable tasks $Y = f(L, K, A)$, where: Y is total output, L is labor (total labor input), K is capital, and A is the level of automation. The production function can be disaggregated to account for automated (M) and non-automated (N) tasks $Y = f(M, N, K)$, where M – tasks that can be automated, N – tasks that cannot be automated.

If we consider generative AI as one way of automating labor, we can use the approach of (Acemoglu, Restrepo, 2018) to modify the $Y = PL$ formula to account for the impact of generative AI:

$$Y^* = PL^* = P(akL + (1 - a)L),$$

where a is the penetration rate of generative AI in an industry; industry penetration rate refers to the share of employees using generative AI in their work; it is clear that depending on the industry there will be a different penetration rate of the technology, because this indicator characterizes the share of automated tasks, and the penetration rate is far from 100%; even in the industry "information and communication activities" it is assumed that it will not exceed 50% by 2030, and in some industries, such as agriculture, construction, etc.,

k – efficiency (productivity) increase due to the use of generative AI. The coefficient is set as a constant, because in the framework of this work the potential impact of technology was assessed taking into account its current level of development. There are three main points of view regarding the further speed of technology development:

1) continued rapid development to strong AI; Mira Murati (chief technology officer of OpenAI) stated that GPT-5 intelligence will reach PhD level in 2025/2026;

2) saturation of the intelligence level of generative AI at the current level given the utilization of current neural network architecture, data volumes, and available computing power (Widder, Hicks, 2024);

3) AI disillusionment hypothesis and the transition to a "third AI winter" with a decline in the technology's popularity (Cahn, 2024).

Due to the high degree of uncertainty, the task of technology development forecasting is left out of this study. The second hypothesis is accepted (saturation of the technology level at the current level), we estimate the economic effect of mass application of the technology in the form in which it is currently available.

We took McKinsey's estimates of ak as the effect of generative AI in the industry as the basis for the estimates[5]. Then, for each industry, we expertly determined the value of k taking into account the experience of Russian companies and existing studies[6]. Based on this, the initial values of a were estimated. We model the dynamics of changes in the value of a in the period from 2023 to 2030 by a logistic curve, with the maximum values also set by experts.

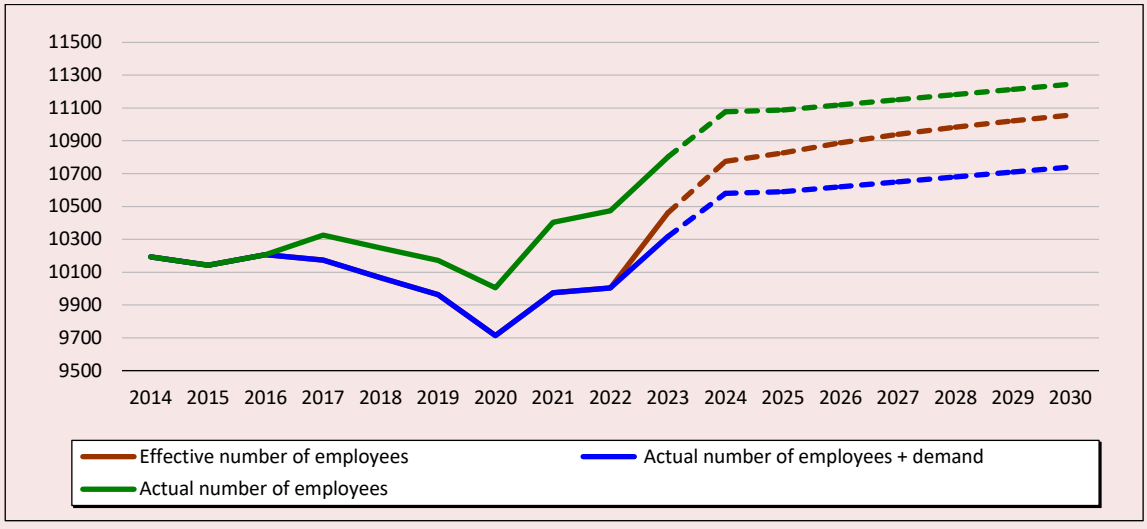
Based on the estimates of penetration and efficiency of generative AI use by industries, we can assess the effective number of employees L^* in each of the industries. There arises the possibility of using scenario approach and parametric modeling, when we can estimate the expected value of output by industries in the described system on the basis of the effective number of employees or, on the contrary, estimate the necessary number of employees that can provide the planned level of output taking into account the assumptions about the level of technology penetration, etc.

As we have mentioned above, it is necessary to take into account the needs V in addition to taking into account the number of employed L, then for each industry we can plot the dynamics of the values of the actual number of employed L, the effective number of employed L^* and the sum of the actual number of employed and needs $L + V$.

It becomes possible to use scenario approach and parametric modeling, when in the described system, we can estimate the necessary level of technology penetration to obtain a certain specified effect or, on the contrary, estimate the possible effect taking into account assumptions about the level of technology penetration, etc.

The calculations have shown that generative AI can reduce the existing staffing hunger in some areas and its impact will not exceed the current staffing needs. *Figures 5, 6* show an example of the dynamics of the number of the employed and the dynamics of the need in personnel on the example of the industry (C) "Manufacturing industries".

Figure 5. Dynamics of the number of employed for industry (C) "Manufacturing industries", thousand people



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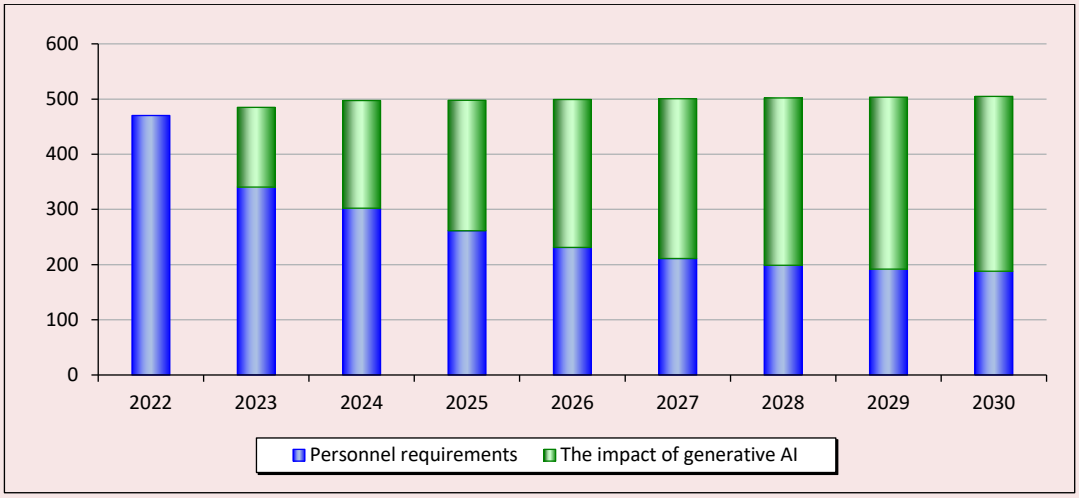
[6] Turning GenAI Magic into Business Impact. Available at: https://www.bcg.com/publications/2023/maximizingthe-potential-of-generative-ai (accessed: February 16, 2024); Goldman Sachs: Upgrading Our Longer-Run Global Growth Forecasts to Reflect the Impact of Generative AI (Briggs/Kodnani); The Economic Potential of Generative AI. McKinsey Report, January 2023.

Figure 6. Dynamics of demand for personnel in branch (C) “Manufacturing industries”, thousand people



The example of forecasting the dynamics of the number of the employed and the dynamics of the need in personnel for the industry (K) “Financial and Insurance Activities” (*Fig. 7, 8*) shows how in a number of industries the impact of generative AI can exceed the existing needs in personnel (wholesale and retail trade; repair of motor vehicles and motorcycles; information and communication activities; financial and insurance activities; professional, scientific and technical activities; education; activities in the field of culture, sports, leisure and entertainment). Excess of the effective number of employed persons over the needs may lead to the growth of industry output above the forecast values or to a decrease in the actual number of employed persons in certain industries.

Figure 7. Dynamics of the number of employed for industry (K) “Financial and insurance activities”, thousand people

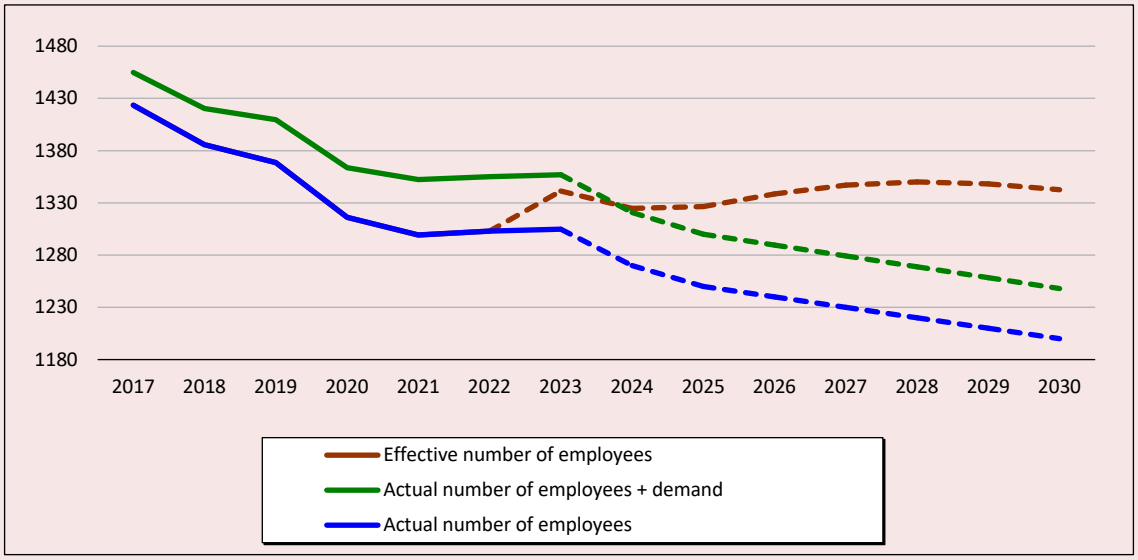


Figure 8. Dynamics of aggregate data on the number of employed by sectors (A-S), thousand people

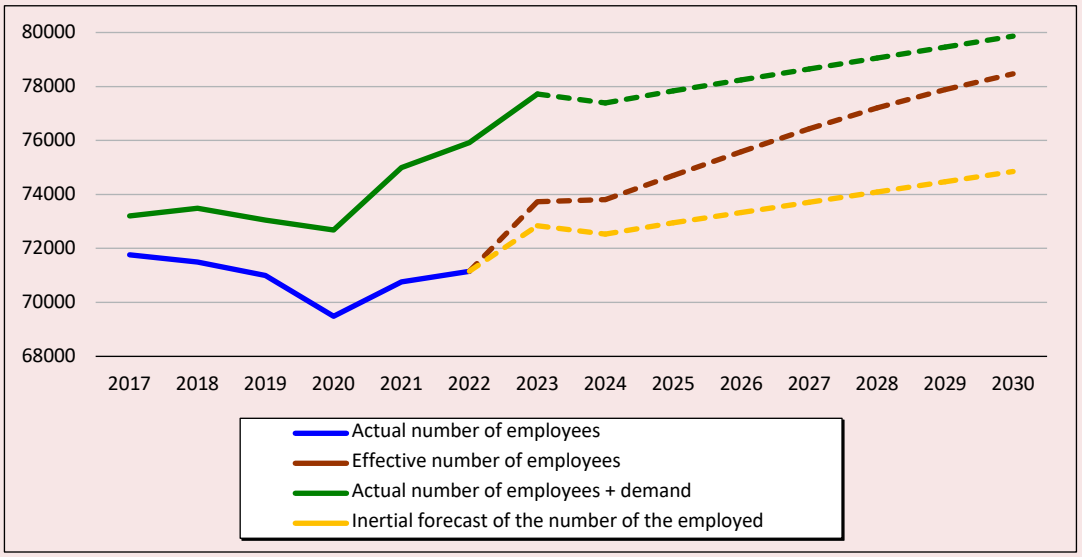
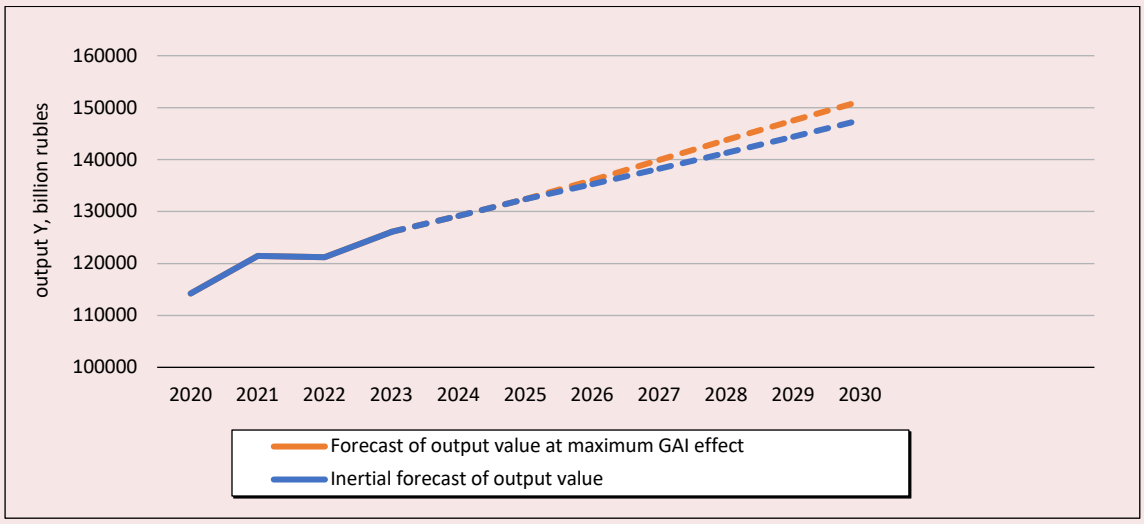


Figure 9 presents the total impact of generative AI on the labor market. We can see that taking into account the impact of generative AI, according to the estimates of the degree of technology penetration in industries and estimates of technology efficiency, we can expect that the existing shortage of personnel can be leveled by about 80%, while we can expect output growth (the sum of GVA by A-S industries) by 2.5% by 2030. This scenario implies that the number of the employed will be in line with the inertial forecast, and output growth is ensured by an increase in the effective number of employed persons. There is a scenario when the increase in labor efficiency will not only cover the needs of a particular industry, but will also lead to the release of some of the employed, to their transfer to other

Figure 9. Scenarios of output growth (sum of GVA by A-S industries) taking into account generative AI, billion rubles



industries where the need for personnel is expected to remain. The graphs of the inertial forecast and the forecast of output values taking into account the influence of generative AI form a superposition of scenarios, i.e. a certain area of possible values.

Conclusion

In conclusion, we should note that the generative AI impact on the labor market is a topical issue. The calculations are based on Rosstat data, forecasts by the Ministry of Economic Development of the RF and the Ministry of Labor of the RF, and estimates by McKinsey, BCG and other analytical agencies. They confirm that the introduction of generative AI is a powerful driver not only for productivity improvement, but also for a major structural change in the labor market. The modified Cobb – Douglas function used in the study showed that in a number of industries, the impact of technology can significantly change the balance of jobs, especially in industries where technology penetration and labor efficiency growth are estimated to be higher (wholesale and retail trade; repair of motor vehicles and motorcycles; information and communication activities; financial and insurance activities; professional, scientific and technical activities; education; cultural activities; cultural and technical activities; and social activities). In total, these sectors form more than 25% of GDP.

One of the key findings of the study is the need to manage the effects of technology adoption, which could close 80% of the current job gap. The adaptive capacity of markets will depend on how quickly government and companies can integrate new technologies into the economy. Forecasts show that if generative AI is applied on a mass scale, the technology will not only offset the labor shortage, but also provide an overall GDP growth of 2.5%. The graphs of the inertial forecast and the forecast of output values taking into account the impact of generative AI form a superposition of scenarios, i.e. a certain area of possible values. Such results confirm the need for a comprehensive approach, which should include retraining programs and active introduction of new technologies in all sectors of the economy.

Thus, in our study generative AI is considered not as a tool for replacing human labor, but as a tool for increasing labor efficiency (productivity). Generative AI at the existing level of technology development allows saving up to 15–25% of employees' time on routine tasks related to processing and analyzing text information. The share of employees performing such work in various industries reaches 10, 30 and 50% depending on the specifics of the industry, which is a potential for the application of generative AI in the economy.

The proposed approach is a primary assessment of the impact of generative AI technology on the labor market, which, of course, cannot take into account all possible structural changes in the economy. Possible changes in the balance are so significant that they change the points of economic equilibrium and many feedbacks, which will have to be taken into account in the future, but the proposed method of assessing the impact of technology can be their basis, it is stable in relation to changes in expert assessments of the initial parameters of the model and gives an initial estimate of the transformation of employment in sectors of the economy, onwhich we can base further research.

It seems promising the analysis of labor market changes under the influence of generative AI in the context of professions. The task of modeling the processes of changing the balance of labor resources in terms of not only employment by industries, but also by occupations arises, since, apparently, it can be assumed that there will be transitions of people not only from industry to industry, but also within industries, and transitions from industry to industry may be accompanied by a change of occupation.

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Fixed Capital Formation Effectiveness in Russia: Trends and Scenarios

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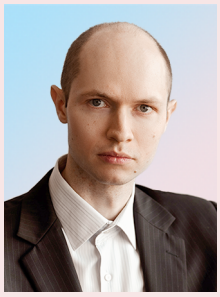

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Abstract. Designing new methods and approaches to assessing the results of long-term economic development is a relevant task within the framework of analyzing and forecasting the development of industries and industry complexes. The paper substantiates an approach to studying the process of capital formation through the full-fledged use of available resources. Based on the data on the dynamics of metal consumption, we show features of gross fixed capital formation. We consider changes in Russia's economic development and highlight three periods in the accumulation of the country's wealth, estimated by the indicators of the metal stock (the crisis situation of the 1990s, the recovery GDP growth in 2000–2013, and the formation of a new mechanism for the reproduction of fixed assets starting in 2014). We define prerequisites for the formation of imbalances in the investment and stock process related to the increase in the country's wealth. We show that restrictions on attracting resources from abroad and the lack of a reliable domestic investment base determine the key problems of the domestic capital formation

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mechanism. We arrange countries of the world in groups according to capital formation indicators, including the availability of resources for capital formation and the availability of favorable conditions for the commercial use of investments. We substantiate the need to increase the effectiveness of capital formation management in Russia. We emphasize that investments in the national investment complex can become effective only if the current criteria for evaluating the effectiveness of economic activity are revised. We provide an overview of the positive and negative scenarios for the development of the domestic capital formation system in the medium term. State management of the investment and stock process is singled out as a necessary element of a positive medium-term forecast.

Key words: investments in fixed assets, final metal consumption, wealth accumulation, reproduction approach, investment and stock process.

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Introduction

Assessing the results of long-term economic development is of fundamental importance for the organization of management, forecasting processes in industries and complexes. As a more general parameter characterizing the dynamics of economic development, we can consider the formation of fixed capital as a key element in increasing national wealth (Kirichenko, 1964; Modeling the Cycle..., 1988; Smith, 2022). The effectiveness of this process should be assessed through the full use of available resources (financial, material, labor, intellectual) necessary for investments in fixed assets. Accordingly, the analysis of trends in gross fixed capital formation based on macroeconomic statistics can be supplemented with data on the dynamics of metal consumption and estimates of changes in the country's metal stock (Zusman, 1982).

The effectiveness of savings in Russia is at a low level and has not changed for many years, alongside negative trends in industries (Khanin, Fomin, 2017). According to Rosstat, the ratio of investments in fixed assets to GDP in 2014–2022 ranged from 19.9% (2021) to 21.5% (2020), while the ratio of gross savings to GDP increased from 24.6% in 2014 to 31.8% in 2022. The ratio of gross fixed capital formation to gross savings, which was more than 85% in 2014 and 2016–2017, decreased to 64–65% in 2021–2022.

There is a significant differentiation between types of economic activity according to the degree of use of own investment resources (net profit plus depreciation) for investments in fixed assets. In machine-building activities in 2014–2018 and in 2022 there was a shortage of own investment resources to finance investments, while in manufacturing industries in general and in the sectors of the construction materials complex in particular in 2015–2022 own investment resources were used by about half (by 54 and 48%, respectively; *Tab. 1*).

It is necessary to understand why the seemingly natural course of events – the process of increasing wealth in the country – is moving forward with great difficulty. To do this, it is advisable to consider changes in Russia's economic development that affect the process of capital formation over a long period of time.

Specifics of the methodological approach

The processes of capital materialization in the country and the capital formation zone in the global economy are proposed to be assessed on the basis of steel consumption indicators, the dynamics of which reflect the results of investment activity. The

Table 1. Capital formation effectiveness in the Russian Federation at different levels of management, %

Indicator	2014	2016	2018	2020	2022
Ratio of gross fixed capital formation to gross savings	87.2	87.3	71.4	83.8	65.2
Ratio of investment in fixed capital to own investment resource (net profit + depreciation) by type of economic activity:					
manufacturing industries	1.12	0.56	0.63	0.63	0.43
complex of construction materials	2.01	0.50	0.62	0.52	0.45
machine-building activities	2.26	1.05	1.48	0.87	1.04
Calculated according to: Investments in Russia. 2023: Statistics collection. Rosstat. Moscow, 2023; EMISS. Available at: https://www.fedstat.ru/					

information base for our research includes data from Rosstat (dynamics of investments, gross formation, and production of ferrous metals in the Russian Federation) and the World Steel Association (indicators of production, consumption, and foreign trade of ferrous metallurgy products by country). We chose apparent steel use as a basic indicator of metal consumption, calculated as production plus net imports of steel products (Budanov, Ustinov, 2020). In contrast to traditional approaches, the study of the natural and material content of investments allows us to formulate requirements for the development of the current reproductive mechanism.

The problem of comparability of data on changes in fixed assets is one of the most important in assessing the formed capital. With the transition of statistical authorities to a mixed method of estimating fixed assets, criticism of official information has intensified. Regression-type research models (Suvorov et al., 2022; Khanin, Fomin, 2017) identify controversial issues in the dynamics of fixed assets related to the virtual components in the revaluation of fixed assets in the process of asset resale, with the effects of changes in the rules of asset registration. The possibilities of using these models in solving predictive tasks are reduced to identifying existing trends. The use of data on the dynamics of final metal consumption in the country not only solves the problem of comparability of information on investments and inputs of fixed assets over a fairly long period of time, but also makes it possible to identify bottlenecks in the investment and stock process.

Periodization of the country's economic development in terms of wealth formation trends

Let us single out three periods in the formation of the country's wealth, estimated by the indicators of the metal stock: crisis situation of the 1990s, recovery growth of 2000–2013, and formation of a new mechanism for capital formation since 2014.

Despite ***the crisis situation of the 1990s***, with the formation of GDP (a decrease of 39% in 1999 compared to 1990), the country's wealth, estimated using data on metal turnover, has changed slightly (a decrease in the absolute volume of accumulated metal reserves by about 2–3%) (Budanov, 2002).

A decrease in the volume of metal investment (domestic consumption of finished rolled products decreased by more than three times in 2000 compared to 1990) occurred in parallel with a decrease in the retirement of fixed assets (the retirement ratio of fixed assets decreased from 1.8% in 1990 to 0.9% in 1999, that is, twofold). The pre-reform model of fixed capital renewal was destroyed, in which up to 90% of the invested resource was used to replace retired machinery and equipment (Budanov, 2002). The change in the mechanism for maintaining fixed assets in operation included mobilization of stocks of resources (at the beginning of the 1990s, stocks of unidentified equipment were almost five times higher than current supplies for investment needs). Measures were taken to increase the service life of the equipment.

A radical change in the conditions of capital formation has led to a decrease in interest in previously prioritized capital formation points and

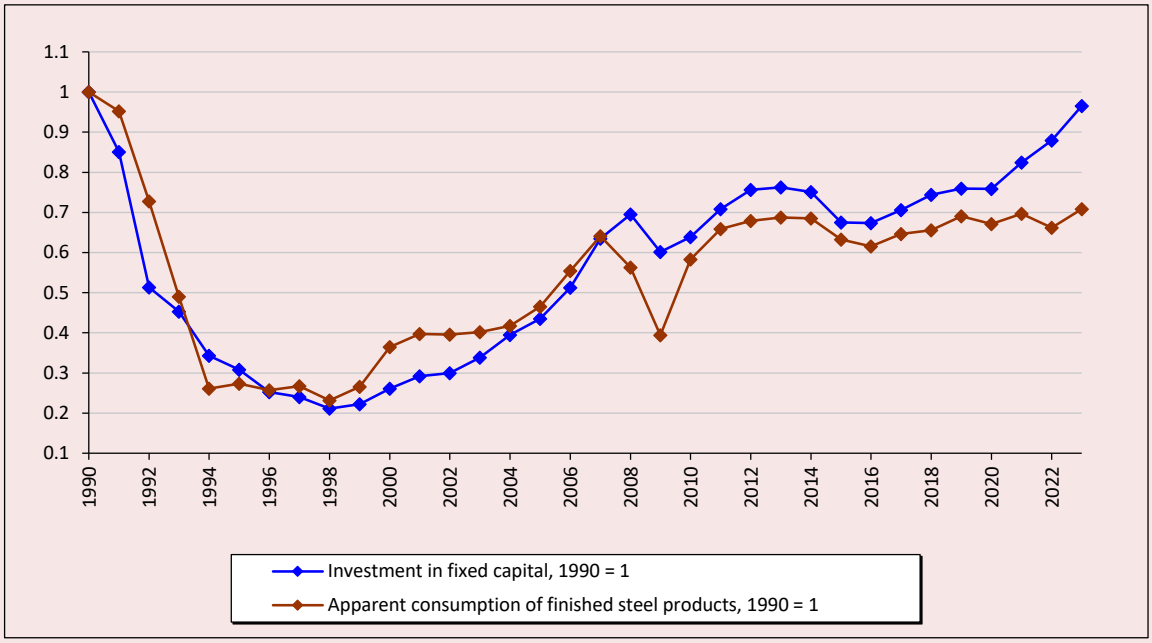
social facilities. Assets related to defense needs and the social infrastructure of enterprises were rehabilitated. In industry, production was being redesigned to meet new demand trends. The sectoral crisis and the privatization of public wealth characterized the structural changes in the Russian economy. Kindergartens became office spaces, enterprises became warehouses, that is, the previously created capital was used for a new purpose.

The export of fixed assets from the country, according to estimates of exports of machinery, equipment and scrap metal (including military equipment), amounted to about 6–8 million tons per year, that is, it occurred on a relatively small scale (less than 0.3% of the country's metal stock). At the same time, resources were attracted from abroad to accumulate capital, including second hand vehicles, high-tech production lines for consumer goods (alcohol, tobacco, household chemicals, food products, warehouse equipment, etc.).

It is significant that at the beginning of the 2000s, wealth per capita, based on the logic of potential sales, was estimated to be six times higher in Russia than in the United States, 20 times higher than in Germany, and 80 times higher than in China. In terms of production capital per capita and the labor component of national wealth, Russia lagged behind the United States (2.3 and 1.8 times, respectively), but with parameters fairly similar to those for the EU countries (Valentey, Nesterov, 2000; Lvov, 2003). The decline in investment in the 1990s, estimated both by the dynamics of physical investment in fixed assets and by the apparent consumption of finished steel products *(Fig. 1)*, resulted from the abandonment of planned investment management, a decrease in the financial capabilities of the economy, and the reorientation of business toward a foreign investment complex (Gladyshevsky, 2004).

Thus, in the process of the 1990s reforms the available opportunities for effective capital formation in the country were missed, the level of use of existing production potential decreased, but in terms of accumulated wealth, the Russian Federation remained one of the world's leading economies (Silvestrov, Porfiriev, 2008).

Figure 1. Dynamics of investment and consumption of steel in Russia



Calculated according to: Rosstat. Available at: https://rosstat.gov.ru/investment_nonfinancial; World Steel Association.

The processes of restoring GDP growth in 2000–2013, including the legalization of shadow schemes, the expansion of the list of paid benefits, etc., went hand in hand with the formation of a new model of capital reproduction in the country (Economic Growth Recovery..., 2016; Shirov, 2023). Of great importance was the creation of new points for capital investment (business with foreign participation, agricultural business formed on the basis of leasing, the sphere of modern communication technology, state megaprojects, and areas of federal programs). After the privatization of property, natural and social capital became a source for current revenue generation by both business and the state. Material capital became a strategic carrier of rental income of the business. The value of assets as a source of access to the country's resources and their involvement in economic turnover was growing. The domestic investment base became an important element of capital formation in other countries in the field of nuclear energy, pipeline transportation, subway and bridge construction. Under the current investment mechanism, it was attractive for the state to place financial capital (funds) abroad, and for businesses and citizens to materialize savings in assets from other countries.

Economic growth in the 2000s was metal-intensive (with GDP growing by 60%, real metal consumption in the country increased 2.15-fold) (Budanov, Ustinov, 2020). In the context of economic growth it was possible to maintain investments sufficient to compensate for the outflow of fixed assets in priority sectors (basic and export-oriented) (Budanov, 2002). Low levels of capacity utilization in depressed industries (less than 25%) indicated the "decline" of fixed capital, rather than its retirement, including due to the lack of funds for retirement. The negative effects of maintaining fixed assets in non-profitable economic sectors were gradually eliminated. Restrictions on the export of scrap metal played a positive role in reducing the gratuitous disposal of assets (a decrease in the export flow from 12.8 million tons in 2004 and 12.65 million tons in 2005 to 2.4 million tons in 2009 and 4 million tons in 2010[1]).

The process of improving the state's wealth management mechanism has led to mixed results. Government authorities lost control over the previously formed capital (optimization of the social sphere), and asset conversion. The "privatization period" was coming to an end, and there started a "period of property redistribution", which ensured an increase in the commercial value of fixed assets (Pappe, 2002). The effectiveness of savings has increased in comparison with the 1990s. The ratio of gross fixed capital formation to gross savings increased from 46.6% in 2000 to 69.5% in 2008, and the rate of investment in fixed assets increased from 15.9% in 2000 to 21% in 2008[2]. This process was accompanied by double-digit growth rates in fixed assets (by 17.8% in 2006, by 23.8% in 2007, in comparable prices). By the early 2010s investment growth in the Russian Federation faced resource constraints. The increase in the physical volume of investments by 19.3% in 2010–2013 was accompanied by an increase in real consumption of finished steel products by 9.5 million tons (from 42.8 million tons in 2010 to 52.3 million tons in 2013) and an increase in net imports of metal-containing products from 6 million tons in 2010 to 8.9 million tons in 2013 (9.6 million tons in 2012).

For the reproduction of fixed capital, a model of investment development in Russia was formed with the exchange of resources on the global market. With a relatively low volume of foreign investment[3], the foreign trade turnover of metal and metal-containing products under this model in 2012–

[1] According to UN Comtrade. Available at: https://comtradeplus.un.org/

[2] Investments in Russia. 2009: Statistics collection. Rosstat. Moscow, 2009.

[3] Investments in fixed assets of organizations with foreign ownership in 2010–2013 accounted for 6–9% of total investments in fixed assets in the Russian Federation, the share of organizations with joint Russian and foreign ownership was 6–8%.

2013 exceeded 200 billion US dollars. In the early 2010s exports of ferrous metals from the Russian Federation in various forms (ore, scrap, rolled products, pipes, and finished metal products) reached 27–28 billion USD per year, while imports of metal-containing products (machinery, equipment, and vehicles) into the Russian Federation in 2012–2013 exceeded 150 billion USD[4].

A certain price for expanding the access to foreign investment resources was the reduction of the need for the development of their production in the Russian Federation. As a result, in the context of the investment growth of the 2000s, it was not possible to stop the process of scaling down the domestic investment base; nor was it possible to restore the investment projects generating system based on domestic competencies. The previously accumulated capital in mechanical engineering and metal processing was being lost (capacity reduction by 15–20%).

Since 2014, fundamentally new trends in capital formation in the Russian Federation have been outlined. Previously existing capital formation mechanisms (transnational, shadow, corporate) have reduced their attractiveness to citizens and businesses, and the state has faced challenges that require capital formation in many sectors (Potential opportunities..., 2022; Russia 2035..., 2024).

Since 2015 the volume of current savings has stabilized at a relatively low level. Thus, the average annual real steel consumption[5] in 2015–2023 is estimated at 47.6 million tons, which is 92.6% of the average annual level of 2011–2014 (51.4 million tons). Savings management has become more active in liberal-market directions: investment climate, investor attraction, high international capital mobility, etc. (Damasceno, Guedes, 2024), that is, in those directions that did not meet expectations in the previous period. Thus, not only the crisis phenomena in other countries (pandemic, closure of markets and trade barriers, over 20,000 existing sanctions), but also the exhaustion of the potential of the current transnational investment mechanism have reduced the results of capital formation in the Russian Federation. The country's economy has faced material and financial imbalances in the investment sector, as well as restrictions from the domestic investment complex.

The effectiveness of savings decreased (Budanov, 2023). With an increase in the savings rate to 31.8% in 2022 (the highest value since the early 2000s), the ratio of gross fixed capital formation to gross savings decreased to 64–65% in 2021–2022 (with the values of this indicator ranging from 71.4 to 94% in 2010–2020).

In the structure of capital investments by type, the share of machinery and equipment in 2022 decreased dramatically to 34.8% (vs 39.5% in 2021); thus, the share of construction and installation work increased. A significant reduction in the share of machinery and equipment in the structure of investments by type of fixed assets indicates the presence of crisis phenomena in the investment process (by analogy with the situation in 2014–2015, when investment activity was influenced by the devaluation of the ruble and the imposition of sanctions on certain sectors of the domestic economy).

There has been a prolonged investment pause in the industry. In the export-oriented sectors, a financial resource has been formed that is exces-sive for current capital investments (1.5-2-fold). The opportunities for the formation in consumer-oriented sectors (trade, various types of paid services to the public) were underutilized. Due to the increase in loan rates (from less than 10% in the early 2010s to more than 20% currently), conditions for capital formation in low-income and high-risk projects have deteriorated. The balance of the financial account of the balance of payments of the Russian Federation in 2022 increased to a record 227.1 billion USD (39.1 billion USD in 2020, 124.1 billion USD in 2021), despite seemingly emerging restrictions on capital formation abroad.

[4] Own calculations according to UN Comtrade.

[5] Apparent steel consumption, taking into account net imports of metal-containing products.

Problems and prerequisites for the formation of a new model of capital formation

The negative phenomena of 2014–2024 predetermined the difficulties of establishing a new mechanism for the reproduction of fixed capital. The flow of resources from abroad necessary for the formation of fixed capital in innovative economic sectors has decreased. A number of priority points of capital formation (the Arctic, aircraft manufacturing, shipbuilding, microelectronics, etc.) have lost imported investment resources for political reasons. As a result, the planned domestic investments in these industries were also not implemented.

The creation of prerequisites for designing a capital formation model based primarily on the domestic resource base was provided by specialized funds (Russian Direct Investment Fund, Industry Development Fund, Internet Initiatives Development Fund, etc.) and measures to implement import substitution policies. The fundraising rate for such projects does not exceed 7%, while in the financial market it does not fall below 20%. Until the 2020s, project financing was carried out in an extremely limited amount (less than 0.1% of total investments) and did not have a significant impact on the investment development of the country. Real changes (a multiple increase in the amount of funds invested in government projects) were noted in 2022–2024. The production of domestic investment products, having received state support, demonstrates high growth rates. Thus, by the end of 2024, the production index in the production of computers, electronic and optical products amounted to 128.8%, in the production of finished metal products – 135.3% (as a percentage to 2023).

In 2024 the effect of the new mechanisms of state regulation of investment activity was expressed both in maintaining high growth rates of investments in fixed assets (8.6% year-on-year for 9 months of 2024) and in the growth of investment-purpose products. Thus, the conditions for capital formation in the 2020s vary significantly by economic sector, and capital formation remains sectoral rather than frontal. The full use of resources in some public investment mechanisms (development of over 100% of allocated funds) related to the defense industry is observed when the implementation of regional programs and development programs of state corporations (Russian Railways, Rostec) is disrupted. This affects the efficiency of the capital formation process in the country.

The problems of the domestic capital formation mechanism related to the restriction on attracting resources from abroad and the lack of a reliable domestic investment base will persist for the foreseeable future (Frolov et al., 2023). Until these problems are resolved, the process of losing the country's accumulated wealth poses the main economic threat to medium-term development. Internal and external trends in demand for investment resources are highlighted in the formation of crisis potential.

First, there are prerequisites for an increase in the volume of compensatory investments in fixed assets in the Russian Federation. The immediate threats are observed in the energy sector that uses imported equipment, as well as in the transport fleet, and the capacities of joint ventures, whose operational resources are gradually becoming obsolete and require updating (Frolov et al., 2023).

Second, the process of accelerated capital formation in China, India, Vietnam and many other countries poses a strategic threat to investments in the domestic economy (Zhou et al., 2024). The flow of resources from the Russian Federation continues to increase to ensure investments in industrializing countries.

Thus, the reproduction processes of 2014–2024, and especially the period of 2022–2024, are of interest for understanding the changes regarding fixed assets in the domestic and global economies. The problems of capital formation in Russia should be considered in the context of the processes taking place in the global economy. Success in capital formation is demonstrated by many countries, including the Russian Federation.

Grouping the countries according to the availability of resources and conditions for effective capital formation

Many phenomena related to economic development in various countries can be explained using two parameters. The first one is availability of resources for capital formation, and the second one is availability of conditions for the effective use of savings. Based on the analysis, it was important to show which countries are getting richer and how they attract resources to materialize financial resources. Since countries vary significantly in size and structure of their economy, and solve different problems, it is possible to apply a universal approach to analysis, but there are no universal solutions that would suit all countries (Budanov, Ustinov, 2020; Budanov, 2023).

To conduct the cross-country analysis, we used data for the last decade (2013–2023) on the volume and dynamics of metal production and consumption, which can be considered as an indicator of the cross-country movement of wealth *(Tab. 2)*.

The ***first group*** of resource-rich countries (where steel production exceeds its apparent consumption) with favorable conditions for the commercial use of investments (resulting in an increase in apparent steel consumption over the period under review) includes four of the six largest steel producers by the end of 2023: China (1,019.1 million tons), India (140.8 million tons), Russia (76 million tons) and the Republic of Korea (66.7 million tons). The highest growth rates of visible consumption of finished steel products in 2013–2023 in this group of countries are noted in India (1.81-fold, from 73.7 million tons to 133.4 million tons), the Netherlands (1.23-fold growth on a low base, from 3.7 million tons to 4.6 million tons) and China (1.21-fold growth, from 741.4 million tons to 895.7 million tons) were noted. While only India showed an annual increase in metal consumption (with the exception of the pandemic period in 2020), in other countries periods of growth in demand in the domestic market (in Russia – in 2017–2019, 2021, 2023) were followed by crisis periods (in Russia 2014–2016, 2020, 2022). In China, the apparent consumption of finished steel products decreased from 741.4 million tons in 2013. to 672.3 million tons in 2015 and from a peak of 1.01 billion tons in 2020 to 895.7 million tons in 2023. The decrease in steel consumption by more than 100 million tons over three years was due, among other things, to the crisis in the construction industry (according to estimates for 2018, 293.5 million tons or about 33% of steel in terms of iron content were consumed in the construction of buildings in China (Yang et al., 2023)).

The ***second group*** includes net exporters of steel products with a decrease in demand in the domestic metal market in 2013–2023. Among the major steel producers, such countries include Japan (steel production of 87 million tons in 2023), Germany (35.4 million tons), Brazil (31.8 million tons), and Iran (31 million tons). They have the resources necessary to accumulate capital, but for various

Table 2. Distribution of the countries by indicators of steel production and consumption in 2013–2023

Conditions of commercial utilization of investments	Resource-rich countries (net exporters of steel products)	Countries experiencing resource constraints (net importers of steel products)	Share in global steel consumption in 2023, %
Favorable (growth in apparent steel consumption over 2013–2023)	China, India, Russia, Republic of Korea, etc.	Turkey, Italy, Poland, Romania, Spain, Mexico, Vietnam, Philippines, Indonesia, etc.	81.8
Unfavorable (decline in apparent steel consumption over 2013–2023)	Japan, Germany, Brazil, Iran, Austria, Sweden, South Africa, Ukraine, etc.	USA, Canada, UK, France, Czech Republic, etc.	18.2
Share in global steel production in 2023, %	79	21	100
Calculated according to: World Steel Association (World Steel in Figures 2024, Steel Statistical Yearbook 2021).			

reasons they face problems of capital loss in the field of industrial production (Araujo et al., 2021). In particular, the apparent consumption of finished steel products decreased by 26% in Germany (from 38 million tons in 2013 to 28 million tons in 2023) and by 18% in Japan (from 65.2 million tons in 2013 to 53.3 million tons in 2023). An example of a country with limited opportunities for capital formation due to economic sanctions is represented by Iran (Aflatooni et al., 2022), which showed a slight decrease in the apparent consumption of finished steel products (by 0.3 million tons in 2013–2023, to 19.5 million tons) with a twofold increase in steel production and the development of its own raw material base during the period under consideration.

In total, the first and second groups of countries accounted for 79% of global steel production in 2023 (mainly due to China, which accounted for 53.9%).

The ***third group*** of countries is characterized by favorable conditions for the commercial use of investments while at the same time having resource constraints (these countries are net importers of steel products). This group includes European economies (Turkey, Poland, Italy, Spain, Romania), Mexico, and newly industrialized Asian countries (Vietnam, Philippines, Indonesia, etc.). The growth of apparent metal consumption in Italy and Spain in 2013–2023 was associated with the recovery after the eurozone debt crisis (Ruščáková, Semančíková, 2016), while in Asian countries the growth occurred due to the increased demand for metal for the development of own industry and infrastructure. The growth in apparent consumption of finished steel products in Asian countries (excluding China, India, Japan and the Republic of Korea) in 2013–2023 was 1.25-fold (+19.6 million tons).

The ***fourth group*** comprises countries that face constraints on the resources needed to form capital and the challenges of creating the conditions necessary for the effective use of investments. The traditional industrialized countries included in this group (USA, Canada, UK, France) are characterized by the effects of material wealth saturation, issues related to maintaining the metal stock (a decrease in input alongside an increase in retirement), reduction in the absolute volume of consumption of structural materials in the economy (Matos, 2022). The created conditions have predetermined such phenomena as the closing down and transfer of capacities to other countries (Tang et al., 2023). In particular, in the UK during the period under consideration, steel production decreased by more than twofold (from 11.9 to 5.6 million tons), in France – by 36% (from 15.7 to 10 million tons), in the Czech Republic – by 34% (from 5.2 to 3.4 million tons). The apparent consumption of finished steel products in the United States in 2023 amounted to 90.5 million tons, which is 24.6% less than in 2000 (120 million tons).

The fourth group also includes countries whose current situation is determined by the aggravation of domestic political and social problems (Venezuela, Argentina, etc.).

According to the analysis, there are countries that are more successful in terms of capital formation dynamics than Russia, and their experience should be taken into account when solving problems of the domestic economy.

Forecast scenarios for the development of the capital formation system in the Russian Federation

As part of the most likely scenario for the development of the global economy, it is possible to consider both positive and negative options for capital formation in the Russian Federation. Given the availability of domestic resources for further capital formation, there is a problem of integrating them into the current investment mechanism. Reorienting the economic system toward increasing the country's wealth is crucial for assessing Russia's prospects (Zusman, 1978; Budanov, Ustinov, 2020; Frolov et al., 2023).

In terms of capital formation, estimated using the data on final metal consumption, Russia

occupies a fairly stable position in the world. The Russian Federation is 1.4 times ahead of the global average in terms of per capita consumption of finished steel products (309.1 kg/person in the Russian Federation versus 219.3 kg/person worldwide in 2023). The absolute volume of real steel consumption in Russia in the 2010s amounted to 480 million tons (3.3% of the global value)[6]. The growth potential for the period up to 2030 allows us to consider the opportunities for doubling investments in wealth formation based on domestic resources as a realistic option.

The domestic capital formation system is attractive for foreign resources investments. In 2011–2013 imports of metal-containing products (machinery, equipment, vehicles, assemblies, and components) exceeded 10 million tons in terms of steel content (the so-called indirect steel imports (Molajoni et al., 2012)). The curtailment of cooperation processes with a number of companies in 2014–2024 was caused by political reasons and can be considered as an opportunistic moment in the restructuring of foreign trade flows. The economic interest in the reliability of investments and their effectiveness allows us to count on an increase in the share of foreign investments in the total volume of investments in the Russian Federation to the pre-crisis level on the horizon until 2030 (from 9.1% in 2013 to 3% in 2022, the share of companies with foreign ownership in investments in fixed assets in the Russian Federation decreased), that is the growth potential is about three times.

Lagging behind other countries does not seem to be critical. In terms of per capita real steel consumption (341 kg/person per year) Russia is slightly inferior to the traditional leaders (382 kg/person in the USA, 389 kg/person in Japan), but due to lower rates of fixed assets retirement, the increase in savings is approximately at the same level. New industrial countries (790 kg/person) pose a more serious threat in terms of the pace of formation and the quality of accumulated capital (790 kg/person in the Republic of Korea, 576 kg/person in China)[7]. A number of issues related to maintaining the competitiveness of the Russian Federation are solved at the expense of previously formed capital, primarily in the military-industrial complex. The situation is less successful in investment engineering, in the production of durable goods and in innovative sectors, where the role of previous investments in production is relatively small. Industrializing countries may reach Russia's level of capital formation in a number of economic sectors in the next decade (as happened in mechanical engineering, electronics of the Republic of Korea, light industry in Pakistan and Vietnam, automotive industry in Mexico, etc.).

Thus, in the forecasting process, current savings should be considered taking into account previously invested funds, the cost of maintaining assets in operation and their updating (compensation for retirement).

The negative and positive scenarios for the capital formation forecast in the Russian Federation differ in the dominant processes rather than quantitative characteristics (Russia 2035..., 2024). Understanding the price of transition between options in the logic of wealth formation concepts is of key importance *(Tab. 3)*.

The ***negative forecast scenario*** proceeds from the idea that the desire for wealth is a natural state of society and the main thing is to let people implement their desire to get richer. At the level of government, there are still hopes that the increase in the country's wealth depends on the rate of saving (saving on consumption), on business profitability (return on investment), and on large companies of global importance. Attempts are continuing to adjust the investment development process based on institutional transformations: improving the investment climate, establishing numerous support structures, and holding investment forums

[6] Calculated according to the data provided by the World Steel Association.

[7] World Steel Association (Steel Statistical Yearbook 2021).

Table 3. Pre-forecast factors and capital formation processes in the Russian Federation

Indicator	Negative scenario	Positive scenario
Formation volume for the period up to 2030, million tons in steel equivalent	250–300	400–500
Formation effectiveness, estimated by full utilization of investment resources, %	60–80	До 100
Invested resources utilization conditions (real per capita steel consumption), kg/person/year	300–350	450–600
Volume of domestic resources generated and investment products attracted from abroad, million tons per year	Under 90	Under 120
Investments in the investment complex in total investments, %	Less than 10	Over 30
Compiled according to: EMISS, World Steel Association, own assessments.		

(Haddad, Verriest, 2024). This view is based not only on the advice of international organizations, but also on the limited capabilities of the state in conducting investment policy. The actions taken do not significantly change the formation of wealth. It is important to understand the imaginary and real reasons for the formation of investment dynamics.

The availability of resources in the country does not guarantee their allocation to the needs of investment development. Thus, in 2013–2023, gross savings in Russia increased from 17.7 trillion rubles to 51.5 trillion rubles (2.9-fold), and investments in fixed assets increased from 13.5 to 34.0 trillion rubles (2.5-fold)[8]. Accordingly, the total volume of underinvestment in capital formation for the period under consideration amounted to 37.8 trillion rubles (in current prices). Based on the proportions between invested and lost (non-invested) funds, a 1.7-fold investment growth by 2030 will be accompanied by the formation of 167 trillion rubles of excess savings (difference between gross savings and investments in fixed assets in total for 2024–2030).

According to the results of 2014–2020s, the role of highly profitable business in the process of the country's investment development raises many questions, and there is an insufficiently effective financial interaction between metallurgical corporations and the state (Pechenskaya-Polishchuk, Malyshev, 2021). In 2013–2020, against the background of an increase in the amount of profit (2.22 times in current prices and 1.45 times in comparable prices) and the net financial result of domestic organizations (1.96 and 1.28 times, respectively), there was a decline in investment activity in the Russian Federation (in 2020 the physical volume of investments in fixed assets amounted to 99.6% of the 2013 level). Short- and long-term financial investments of enterprises are many times higher than current capital investments; that is, in conditions when investment products are insufficient to ensure the current financial flow, previously formed funds will remain unclaimed for a long time (money overhang).

The dependence of the investment process in the Russian Federation on resources attracted from abroad, observed in the 2000s (the dynamics of investments in fixed assets was 80% described by changes in imports of machinery and equipment), increased in the 2020s after the shock of the late 2010s (coefficient of determination is 0.86). Domestic consumers are losing the competition for Russian metal and other investment products. All the same, about 30% of the resources released as a result of the sanctions were exported to the EU and the United States. The leading importers of this resource from Russia are TNCs, which direct it to the industrialization of other countries. They are also the largest suppliers of investment products to the Russian economy.

In the 2020s there is a gap between the dynamics of metal consumption and investment (the physical volume of investments in fixed assets in 2023 increased by 27.2% compared to 2020, while the

[8] According to Rosstat. Available at: https://rosstat.gov.ru/investment_nonfinancial, https://rosstat.gov.ru/statistics/accounts

apparent consumption of steel increased by only 5.4%). This problem is described in special studies (Russia 2035..., 2024). Currently, capital formation in Russia is carried out in conditions of resource constraints, with an imbalance "between the growth of business income and the slowdown in investment" (Russian Territories..., 2022). The imbalances lead to a high profitability of participants in investment activities (developers, resource suppliers, etc.). Investments in fixed assets increased 1.45-fold in 2017–2021 (in current prices), while the growth rate of net profit in metallurgical production was 3.84 times, in the production of other non-metallic mineral products – 4.34 times, in construction – 5.43 times. The conversion of investments into current super profits of business is the main threat to the existing capital formation system in the country. Investment activity has become a source of income exported from Russia and invested in foreign capital. Capital formation in the Russian Federation is becoming unprofitable not only for business (the amount of funds invested is higher than the value of the asset being created), but also for the state.

The country's specialization in metal production on the global market does not mean success in meeting domestic demand for metal (Ilyin et al., 2021). Having solid reserves and the production of primary raw materials, it may find itself without resources to accumulate capital if the concentration of capital in its investment complex is not ensured. The country has been saving on this for a long time under the slogan "down with production for the sake of production", the priority is given to people rather than "production of the means of production". There are many reasons for this, but the main thing is that generating income by capital "decumulation" is more attractive to businesses than increasing wealth through effective capital formation. There was no understanding at the government level that by using the global investment complex to meet domestic capital formation needs, the country was "saving" on its own wealth.

Thus, the main threats determining the negative scenario of capital formation in the country are described by the observed trends in the investment and stock process. The formed capital creates prerequisites and sets limits on the process of national economic development, determining the need to address many issues (for example, dilapidated housing, "rust belts", single-industry towns, etc.). In 2025–2030 the tasks are to ensure the exploitation of existing assets in the new international conditions and compensate for the outflow of fixed assets created on the basis of imported resources. According to rough calculations, this may require all the resources currently available to the domestic economy. The transition to the loss of previously accumulated capital in the country in a negative scenario is most likely to occur in the early 2030s.

State management of capital formation, that is, the investment and stock process, including the production of investment products, is a necessary element of a positive medium-term forecast scenario. An effective increase in the country's wealth is possible in various ways, which were tested in the 2010s and 2020s. There is a positive experience of companies that have formed their own system for generating investment resources and have created an investment development base (Rosatom, Mosmetrostroy, etc.). Various leasing centers contribute to the formation of capital in the agro-industrial complex, national transport system and the growth of production of investment products. By including the investment component in the price of products, progress has been achieved in the development of energy and transport infrastructure (On the Long-Term..., 2022). Investments in promising sectors of capital formation are equally important. On the basis of scientific institutions, new investment resources are being generated, and conditions are being created for the effective use of public funds (Frolov et al., 2023). Corporations have gained successful experience in accumulating capital as part of adapting production to the actual

available resources and demand trends. When conducting investment policy (areas, materials, labor, finance) they used design solutions and specialized equipment from foreign companies.

The country has very few resources to create assets that would be valuable in the long run. It should be borne in mind that currently the output of investment-purpose products in the Russian Federation is about 15–20% of the 1990 level. There are examples of production revival within 2–3 years in those areas where the previously formed capital (MIC) has been preserved, but there are also many examples of failures to restore the production of machinery and equipment (aircraft engineering, instrument making, machine-tool industry, etc.).

The shift of the reproduction mechanism from relying on foreign investment potential (a leading role until 2014) toward creating own resource support for the investment and stock process will determine the prospects for increasing the country's wealth (Russia 2035..., 2024). The transition from a foreign to a domestic investment base is primarily a matter of capital formation in the relevant economic sector. It is quite difficult and expensive to eliminate the dependence of investment activity on imports due to the need to restore the investment and stock process in the country as the material basis of savings (Kirichenko, 1964; On the Long-Term ..., 2022; Frolov et al., 2023). The structure of final metal consumption is an indicator of the processes observed in the investment sector. The transition from a basic resource to advanced processing products and investment products requires an increase in current costs and preparation of the production framework. To increase investments in fixed assets by 1–2%, it is necessary to increase the volume of generated investment resources by 5–10% per year, and this is possible with an increase in fixed assets of investment complex enterprises by a similar amount. As a result, the investment growth model initially concentrates the growth of investments in the country into the investment complex itself.

The elements of a positive scenario for increasing the country's wealth based on capital formation are outlined in government plans[9], requirements for executive authorities[10] and other materials of strategic importance[11]. The unfavorable trends in the development of the country's fixed assets, primarily in socially significant sectors and infrastructure, are implicitly identified, and solutions to the tasks set are proposed. Due to the inertia of the capital formation process, in order to reverse existing trends, more radical actions may be required regarding the management of the development of the country's fixed assets, the formation and implementation of depreciation policy, and the strengthening of the material base that ensures the reproduction of fixed assets.

Organizing the work with state property requires fundamental changes. Management decisions should focus on the increase of fixed capital and its modernization, and the problem of "unnecessary assets", raised by the Minister of Economic Development, as well as rehabilitation and privatization, should be considered as a flaw in the current system of organizing the work with the previously formed wealth.

The requirements for the targeted use of depreciation deductions should become an integral part of the country's reproductive policy. It is necessary to overcome the situation in which less than 10% of the depreciation accrued in some industries is allocated for investment. In the future, depreciation charges should become not only the

[9] Unified plan to achieve the national development goals of the Russian Federation for the period up to 2030 and for the planning period up to 2036 available at: http://static.government.ru/media/files/ZsnFICpxWknEXeTfQdmcFHNei2FhcR0A.pdf (accessed: February 20, 2025).

[10] On assessing the effectiveness of the activities of the highest officials of constituent entities of the Russian Federation and the activities of the executive bodies of constituent entities of the Russian Federation. Presidential Decree 1014, dated November 28, 2024.

[11] Spatial Development Strategy of the Russian Federation for the period until 2030 with a forecast until 2036. Approved by RF Government Resolution 4146-r, dated December 28, 2024.

main source of long-term investments, but also the basis for financing activities to preserve and increase national wealth.

It is necessary to form a specialized economic sector that would ensure the maintenance of the country's production facilities. Within the framework of this direction, the tasks of low-efficient use of resources, the "garage economy", and the risks associated with poor-quality equipment maintenance are being solved, but, most importantly, the tasks of increasing the countryэs wealth based on previously created assets are being addressed as well. Technologies of modernization, restoration and protection of assets of existing production improve the operational characteristics of machinery and equipment, increase the reliability of buildings and structures.

Together, this will make it possible to avoid the implementation of a negative forecast for capital formation, eliminate the most likely threats and, after the 30 years of sales, move toward positive trends in increasing national wealth.

Conclusion

There are ambiguous processes in the world that quite simply become unambiguous if the change in national wealth is taken as the basis for assessing the results of economic activity – in terms of natural rather than monetary indicators. We focused on them by considering the resource support of the investment process and capital formation in the country.

The proposed approach makes it possible not only to assess the scale of the problem (the need for annual renewal of assets with a total weight of about 50 million tons), but also to identify key areas for solving existing problems. Normalization of the investment and stock process in the country can be considered in conjunction with the intensification of actions to maintain fixed assets in operation. The use of restorative technology, modern means of protection and modernization of products makes it possible to reduce quite significantly (10–15-fold) the cost of metal products to compensate for the retirement of machinery and equipment.

In order to increase national wealth by 150–200 trillion rubles by 2030 (potentially available additional savings), it will be necessary not only to increase metal consumption by 200–250 million tons (in total over the period), but also to create capacities for their transformation into the country's assets. This means an increase in capital formation in the fixed assets of the country's investment complex by 2.2–2.3 times, which requires active government intervention in this process.

The analysis shows that the investment process in the 21st century is still a process of converting the obtained economic results (money) into valuable assets, and this requires metal. We would like to emphasize that there is no other way to accumulate national wealth other than investment; that investments are a process of materializing finances, i.e. creating assets, and that the inevitable consequence of capital formation is obvious resource constraints on investment development.

The forecast prospects for capital formation are determined by the effectiveness of creating an appropriate system. Investments in the country's investment complex, including domestic machine tool manufacturing, electronics, aircraft manufacturing and other heavy industries, cannot be effective under current criteria for evaluating the effectiveness of economic performance. The result of the adopted approach is a decrease in the efficiency of investments in 2000–2024, while huge resources remain unaffected in the process of national wealth accumulation.

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On Assessing the Impact of Social Risks on the Life Expectancy of Economically Active Population

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Abstract. Intensive transformations of public life generate a wide range of social risks that have a negative impact on the life expectancy of economically active population. In addition to the well-described risks (insurance, environmental, food), an increasing number of new threats are emerging (digitalization, pandemics, geopolitical challenges, etc.); this exacerbates issues related to the ability and possibility to adequately respond to environmental requirements at the individual level, and also determines the need for timely and correct management decisions in this area at the meso and macro levels. All this highlights the need to deepen the scientific understanding of the current structure of social risks and find new approaches to assessing the impact of social risks on the population. Thus, the aim of the study is to identify current social risks and assess their impact on the life expectancy of economically active population in Russian regions. The research data were derived from Rosstat's statistics on the socio-economic situation of Russia's regions for 2019–2022. At the stage of exploratory research, in order to clarify the structure and content of social risks, we used factor analysis, which determined the social risks relevant to the economically active population of Russian regions during the period under review; we also put forward their typology in terms of duration of exposure (systems and situational). Using automated regression modeling methods, we determined the importance and significance of the identified risks in each of the years under consideration (2019–2022). Scientific novelty of the study lies in proving that life expectancy of the economically active population of Russian regions is influenced by systems social risks typical for the entire period in question, as well as situational social risks that are short-term and

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that arise during the crisis. It is proved that the results obtained help to apply a differentiated approach to the implementation of measures to increase life expectancy – through long-term strategic programs to reduce the impact of systems social risks or targeted short-term solutions of a predominantly economic nature to overcome the negative impact of situational social risks, which can contribute to improving the effectiveness of governmental and regional social policy.

Key words: social risk, factor analysis, assessment, life expectancy, region, economically active population.

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Introduction

The modern stage of society development is characterized by intensive transformations in all spheres of human activity, which lead to the emergence of global challenges and threats, whose quantitative and qualitative explosive growth is in contradiction with the objectives of sustainable development. This contradiction is reflected in Agenda 21[1] and the Sustainable Development Goals[2], which identify global challenges faced by humankind and the overcoming of which is a key factor in ensuring sustainable development for the benefit not only of the present but also of future generations.

In an ever-changing world, there are increasingly acute issues related to the ability and opportunity to adequately respond to the requirements of the environment, to choose the optimal way to respond to increasing challenges in the form of some form of behavior (destructive or constructive). Thus, the individual and society are constantly in a situation of uncertainty and the need to make a decision, i.e. in a situation of risk. In foreign literature, the concept of risk appeared in the 1920s (Knight, 1921), but only in the second half of the twentieth century a separate direction of research related to the issues of insurance and finance was formed. Over time, the concept of risk acquired interdisciplinary character –specialists in sociology (Beck, 2000; Giddens, 1994; Luman, 1994), psychology (Allen, Badcock, 2003), behavioral economics (Lupton, 1999; Kahneman, Tversky, 2003), socio-cultural studies (Douglas, 2000; Hofstede, Minkov, 1997) brought the concept of risk into the conceptual framework of socio-humanitarian sciences.

Interest in the problem of risks emerged later in the Russian literature, and the heyday of works on insurance risks falls on the reform period of the 1990s. At the same time, scientific works of that period reflected the social aspect more than the financial one, which led to the emergence of the category of social risk. Continuing the ideas of Beck and Giddens, O.N. Yanitskii connects the concept of risk with crisis, social conflict and anomie (Yanitskii, 2003), V.I. Zubkov – with the process of decision-making by a subject and their actions in conditions of uncertainty (Zubkov, 2001). Economic aspects of social risks are considered by Russian scientists in connection with the loss of material security due to the inability to continue labor activity (Tamoshina, Timoshina, 2009; Barannik, 2012).

At the current stage of research, social risk is studied through the prism of instability, non-linearity of societal development, which generates new risks for the life activity of society (Mikryukov, Ilyushin, 2022) and determines the need to

[1] Agenda 21. Available at: https://www.un.org/ru/documents/decl_conv/conventions/agenda21.shtml (accessed: October 15, 2024).

[2] Sustainable Development Goals. Available at: https://www.un.org/sustainabledevelopment/ru/ (accessed: March 25, 2024).

solve problems under conditions of uncertainty (Zolotarev, 2024; Lockie et al., 2024; Wang et al., 2024). We should say that, despite individual attempts to conceptualize the concept of social risk (Maksimovich, 2023), a significant part of Russian and foreign works is devoted to the study of social risks in the application to specific spheres of society (Leontieva, 2020; Li, 2024; Nguen, Cole, 2024; Liu et al., 2024; Jones et al., 2024; Li et al., 2024). As a result, in our opinion, there is a fragmented view of social risks arising in the context of individual threats, but significantly less attention is paid to the search for the relationship between social risks and the life activity of the population as a whole.

In this regard, there is a need to expand scientific approaches to understanding and assessing social risks. In our opinion, this is possible with the involvement of methodological provisions of human social biology developed by Academician of the Russian Academy of Medical Sciences T.B. Velichkovskiy. The main method of cognition in human social biology as an interdisciplinary field of scientific knowledge is a comparative analysis of demographic and health indicators of the population, on the one hand, and socio-economic conditions of society, on the other (Velichkovskiy, 2012). T.B. Velichkovskiy emphasizes that the level of health and life expectancy are determined not only by the biological characteristics of the population, but also by the socio-cultural context, in particular, by the structure of social risks (Velichkovskiy, 2013).

In this study, social risk will be understood as a situation of uncertainty arising under the influence of environmental transformation factors and having a significant potentially destructive impact on the life expectancy, which reflects the population ability to withstand the above stressful situations (transformations of the external environment), while maintaining the ability to grow and develop, Thus, life expectancy is an integral indicator of socio-economic well-being and health of the population in conditions of high uncertainty, and the aim of the study is to identify social risks relevant at the current development stage of Russian regions, as well as to assess their impact on the life expectancy of the economically active population.

Data and methods

The presented research is exploratory in nature and is aimed at identifying social risks and assessing their impact on life expectancy as a comprehensive indicator that aggregates assessments of health, social capital, socio-economic well-being of the population (Cai et al., 2023; Iyakaremye, Tripathi, 2024; Onisanwa et al., 2024; Salehi, Sedgh, 2023). This indicator is quite mobile, responsive to the realization of social risks and reflects the dynamics of the social environment, which was evident, for example, during the COVID-19 pandemic, when life expectancy fell sharply by the end of 2021 and then began recovering[3].

In our work, the object of the study is the economically active population (aged 15 years and older) of Russian regions, which, on the one hand, takes an active part in the socio-economic life of society and thus forms the conditions for the realization of social risks, and on the other hand, has subjectivity in terms of adaptation to the transforming environment. In addition, researchers note that for a long period of time the main contribution to the formation of mortality in Russia (and, consequently, life expectancy) is made by people of productive age[4] (Narbut, 2016), which also determines the relevance of studying the structure and impact of social risks on life expectancy in this age category.

To determine the structure of social risks and assess their impact on life expectancy, we used

[3] Demography. Rosstat. Available at: https://rosstat.gov.ru/folder/12781 (accessed: May 14, 2024).

[4] Shcherbakova E. (2024). Preliminary demographic results of 2023 in Russia (Part II). *Demoscope Weekly*, 1023–1024. Available at: https://www.demoscope.ru/weekly/2024/01023/barom02.php (accessed: January 10, 2025).

Rosstat data on socio-economic development of Russian regions in 2019–2022, among which we selected by methods of logical and statistical analysis the indicators of regional development that have even a small but statistically significant relationship with life expectancy at the age of 15, on the one hand, and potentially characterizing social risks, on the other *(Tab. 1)*.

The choice of the study period is justified by several considerations. On the one hand, it is necessary to ensure the completeness of statistical data. For example, the data on age-specific survival rates in Russian regions, which are necessary for calculating life expectancy aged 15 years and older, in the regional context are available only from 2019. In addition, some of the socio-economic indicators

Table 1. Indicators of socio-economic development used in factor analysis for identifying social risks

Group of indicators	Socio-economic development indicators	Correlation coefficient with LE_15 (at p = 0.05)
Standard of living, income	Purchasing power of the population's income, times	0.104
	Share of population with incomes below the subsistence minimum, %	0.016
	Share of housing and utilities and fuel costs in consumer expenditures, %	-0.418
	Gini coefficient, times	-0.047
	Wages, rubles	-0.144
	Average amount of assigned cash payments per person, rubles	0.267
Employment and labor conditions	Unemployment rate according to ILO, %	0.420
	Share of employees with higher education, %	0.537
	Share of employees with SES, %	-0.470
	Share of employment in industry, %	-0.238
	Occupational traumatism, per 100,000 population	-0.404
	Share of the employed with no professional education, %	-0.016
	Share of those employed in harmful working conditions, %	-0.437
Incidence	Incidence of neoplasms, established for the first time, per 1000 people	-0.300
	Share of persons with disabilities in the total population, %	0.249
	The incidence of endocrine diseases, established for the first time, per 1000 people	-0.181
	Disease incidence per 1,000 population	-0.284
Demographic status	Share of population over working age, %	-0.159
	Total fertility rate, children per 1 woman	-0.024
	Ratio of marriages and divorces, per 1000 marriages	-0.100
	Share of childless households, % of total number of households	-0.557
Communications and social relations	Population anxiety index	0.207
	Share of population with daily Internet access, %	0.225
	Share of single private households, % of total number of households	-0.411
Destructive behavior	Share of external deaths in total mortality, %	-0.444
	Share of patients with mental disorders re-hospitalized during the year, %	-0.204
	Share of alcoholics hospitalized repeatedly during the year, %	0.035
	Share of drug addicts re-hospitalized during the year, %	-0.002
	Share of homicides in total mortality, %	-0.386
	Recorded crimes per 100,000 population	-0.744

Source: own compilation based on Rosstat data.

are also calculated only for certain periods: the anxiety level in Russian regions is calculated only from 2019; data characterizing the prevalence of information and communication technologies from 2014; information on single households is available only from the 2010 and 2020 population censuses and the 2015 microcensus. However, all these characteristics of social risks are important in the context of our study, which significantly limits the time period for analysis.

On the other hand, the argument for choosing the study period was the possibility of conducting a comparative analysis of social risks in dynamics. The selected period includes years that differ significantly in their characteristics. For instance, 2019 can be defined as relatively stable in terms of socio-economic development; while the period 2020–2022 is characterized by high instability, including the period of pandemic (2020–2021), as well as the period of aggravation of the geopolitical situation and the build-up of economic sanctions (2022). This diversity of external conditions (stability/instability) and threats (pandemic, sanctions, geopolitics) determines the need to analyze each year separately and allows putting forward a hypothesis about the different structure of social risks compared to the period of stability[5].

At the stage of exploratory research, we propose to proceed from the assumption that various social risks are certainly realized in Russian regions, but there is no a priori knowledge of their number and structure. In this regard, we use the method of factor analysis (principal component method, varimax rotation) implemented in the statistical package SPSS to identify specific social risks realized in a particular period. It assumes that known variables depend on a smaller number of unknown variables and random error. This method allows identifying the relationship between variables when several indicators highly correlated with each other are combined into one factor (in our case – social risk) (which, incidentally, allows further solving the problem of autocorrelation of variables, for example, in regression analysis). Thus, we determine a compact and visual structure of factors (in our case, social risks) as a result of dispersion redistribution, each of which receives its own designation based on the meaningful interpretation of the variables assigned to each factor according to the factor analysis results. Thus, the structure of social risks that determine the key threats to the life expectancy of the economically active population in this or that period is formed.

At the final stage, to determine the impact of social risks on the life expectancy of the population, we build regression models with the step-by-step inclusion of social risks (factors) obtained at the previous stage and assess the statistical significance of the reliability of the obtained models in accordance with the information criterion. The calculations were implemented in the statistical package SPSS using the module of automated linear modeling. This helped to assess the impact of social risks on the life expectancy of the population aged 15 years and older, as well as to identify differences in the factor influence in separate periods of time.

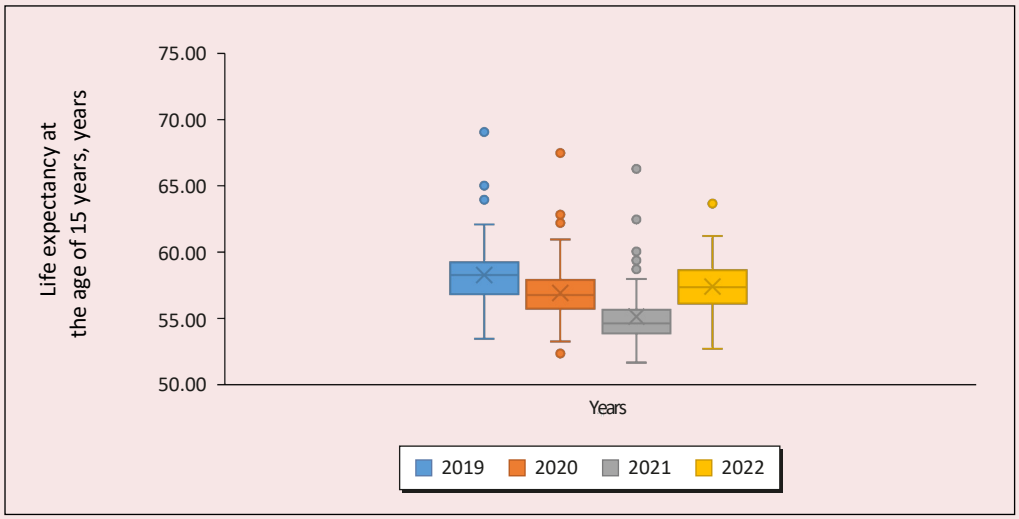
Results

Life expectancy at the age of 15 years (LE_15) shows both significant dynamics in Russia as a whole and significant intra-regional differentiation *(Fig. 1)*. For example, while in 2019, it was 58.9 years; in 2021, it decreased to 55.6 years (as a result of the COVID-19 pandemic effects), and then began recovering and reached 58.3 years in 2022.

At the same time, intra-regional differentiation by this indicator has decreased: the difference

[5] Due to the possible diversity of external conditions that provoke the actualization of certain social risks, the period beyond the boundaries of the period considered in this study, for example, 2008 – the period of the global financial crisis, is also of scientific interest. However, this requires significant efforts to harmonize statistical data and select alternative indicators to obtain comparable results, which represents an additional methodological challenge and is beyond the scope of this study.

Figure 1. Dynamics of life expectancy aged 15 in Russian regions in 2019–2022



Source: own compilation based on Rosstat data.

Table 2. Social risks for the population of Russian regions in 2019–2022 (based on the results of factor analysis)

Social risks	2019	2020	2021	2022
Socio-demographic status	v	v	v	v
Level of violence	v	v	v	v
Digitalization and digital competencies	v		v	v
Socially significant diseases	v	v	v	v
Morbidity and working conditions	v	v	v	v
Availability of social support		v		
Level of education		v	v	v
Living standards and inequality		v	v	
Level of stress	v	v	v	v

v it is noted the risks identified in the period.
Source: own compilation based on Rosstat data.

between the minimum and maximum value decreased from 15.6 years in 2019 to 11.3 years in 2022. Moreover, in 2022, there is only one region with an extreme high value of the indicator, while in previous years there were three or four of them.

The factor analysis allowed identifying the system of social risks that formed the challenges and threats to the life expectancy of the population of Russian regions in the period under consideration *(Tab. 2)*. For instance, the risks of socio-demographic status in the form of age, marital status, presence of children, unemployment status are manifested throughout the entire period of the study. The level of education, which is usually included in the socio-demographic status, according to the results of factor analysis forms a separate social risk, which emphasizes its importance for the economically active population of the Russian regions beyond its connection with demographic characteristics and income level.

Constantly observed social risks are also the quality of working conditions and morbidity of the population associated with them (occupational injuries, endocrine diseases, etc.). In addition, significant risks of violence prevalence (mortality from external causes and homicide) and socially significant diseases (drug addiction, alcoholism), as well as the level of stress of the population, which is reflected in the form of the dynamics of anxiety of the media and social networks audiences in the country as a whole and in the regional context, have been identified[6].

The digitalization level and the formation of digital competencies also act as a source of social risk for the life expectancy, which is related both to the availability of better quality high-paid jobs and, in general, to the inclusion in the information field and social interactions, a significant part of which has moved online. The level of education and the quality of social capital have become risk factors (Li et al., 2024) during the rapid evolution of the COVID-19 pandemic in 2020, suggesting that there may be a relationship between the level of health literacy and the likelihood of alternative, often ineffective, treatments, which to some extent determined the incidence of morbidity and excess mortality during this period. Clarification of this hypothesis is of scientific interest, but is beyond the scope of the current study.

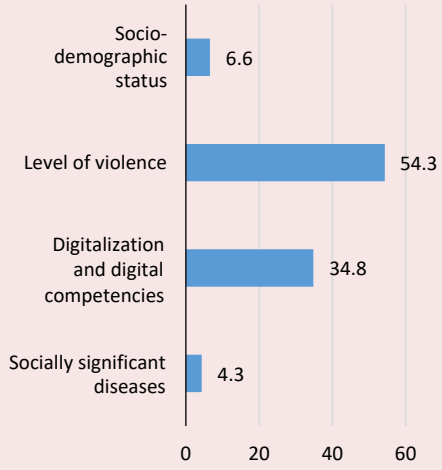
During the pandemic, the standard of living and the degree of inequality manifested themselves as a social risk, which, in our opinion, reflects the number and variety of different resources for adaptation in the conditions of the emerging challenge (availability of a financial safety cushion, alternative sources of income, availability of paid medical services, etc.). In addition, in 2020, the (un)availability of social support as another source of adaptation to the negative socio-economic consequences of the pandemic for certain categories of the population became a significant risk factor.

Regression modeling based on the identified social risks made it possible to determine their importance for the life expectancy. Such social risks as the level of violence (54.3%) and digitalization (34.8%) became the most important for the life expectancy of the economically active population in 2019 *(Fig. 2a)*. We can note that the increase in the level of violence (the development of this social risk) is negatively related to the dependent variable, i.e. the growth of crime in general and especially the number of violent crimes (murders, crimes with serious harm to health) reduces the life expectancy of the population over 15 years *(Fig. 2b)*, which is generally expected from the point of view of the methodology for calculating life expectancy, and thus confirms the reliability of the results obtained. The risk of digitalization has a positive relationship with the dependent variable, as it is expressed in the indicators that directly reduce this risk (provision with appropriate infrastructure and the development of digital competencies of the population). Thus, the reduction of this factor in the model leads to a decrease in life expectancy of the studied age group of the population.

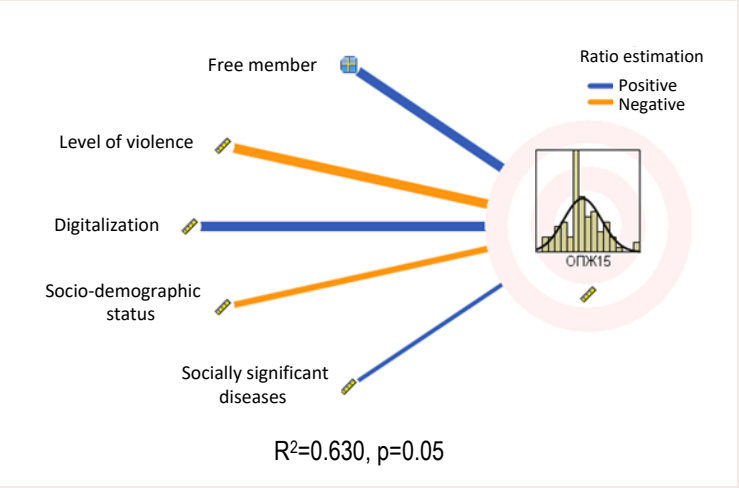
The third most important risk in 2019 was the risk associated with the socio-demographic status (6.6%), and the negative sign of this factor in the regression model should be explained: since the factor itself is formed from indicators negatively associated with life expectancy and adaptive capacity (the share of the population above working age, the absence of a family or, conversely, the presence of a large number of children create preconditions for vulnerability to environmental challenges), its increase decreases the LE_15. Socially significant diseases (alcoholism, drug addiction) also have a significant, although not very large, impact on LE_15, and the positive sign of

[6] The national anxiety index. Research. Available at: https://www.cros.ru/ru/exploration/anxiety/ (accessed: April 9, 2024).

Figure 2. Regression modeling of the impact of social risks on life expectancy of economically active population of Russian regions in 2019



a) importance of social risks, %



b) regression model

Source: own compilation based on Rosstat data.

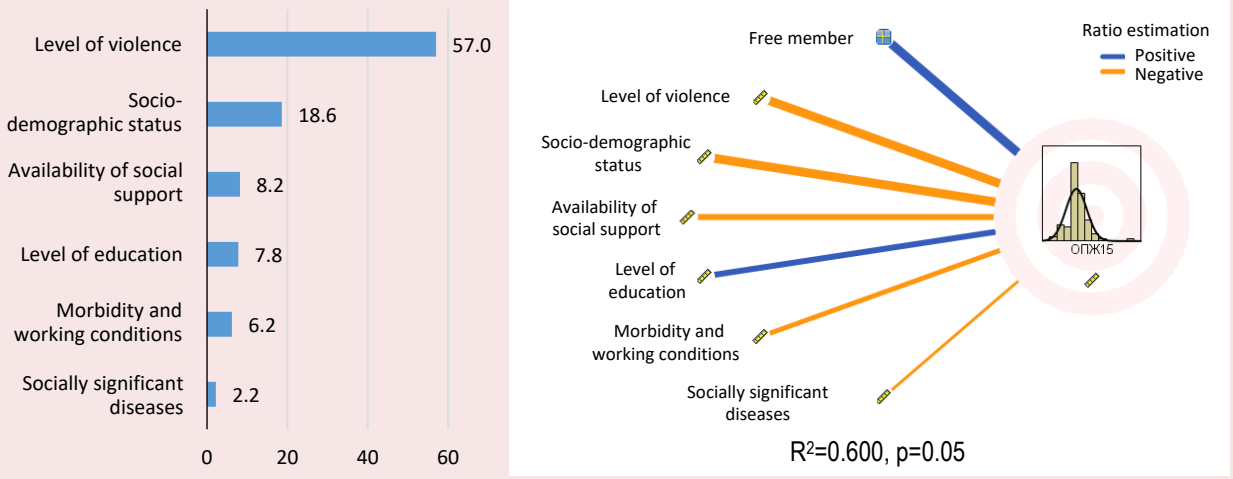
the impact of this social risk in the model is due to the fact that, like any indicator of morbidity, it indicates not an increase in the prevalence of this phenomenon in society, but rather a better and earlier diagnosis in conditions of relative stability and accessibility of medical care, which contributes to better treatment and, consequently, an increase in life expectancy.

It is worth noting separately that the social risks significant from the point of view of factor analysis (labor conditions and morbidity, as well as the level of stress) were not included in the model when building the regression because the obtained coefficients for these variables turned out to be statistically insignificant, therefore, they had no appreciable impact on the life expectancy of the economically active population in 2019.

The pandemic period in 2020–2021 has significantly changed both the number and priority of social risks for life expectancy of the population of Russian regions aged 15 years and older *(Fig. 3, 4)*. The dominant influence of such risks as the level of violence (57.0%) and socio-demographic status (18.6%) remained in 2020.

Cardinal transformation of living conditions (sharp increase in morbidity and mortality, lockdown of the economy, destruction of economic ties and social relations) also determined the emergence of additional risks. The importance of the availability of social support amounted to 8.2%, and this impact is negative. Thus, the increase in social payments reflects the level of poverty and economic vulnerability of the population. In addition, an important factor is the level of education, on the one hand, reflecting the adaptive capacity of the population to changes in the labor market, and on the other hand, the degree of awareness and rationality of the population's behavior in relation to COVID-19 (Peter et al., 2024). Also, the level of morbidity and working conditions as a determinant of the health of the working-age population and aggravating factor in COVD-19 had a significant impact on the life expectancy of people aged 15 years and older.

Figure 3. Regression modeling of the impact of social risks on life expectancy of economically active population of Russian regions in 2020.



a) importance of social risks, %

b) regression model

Source: own compilation based on Rosstat data.

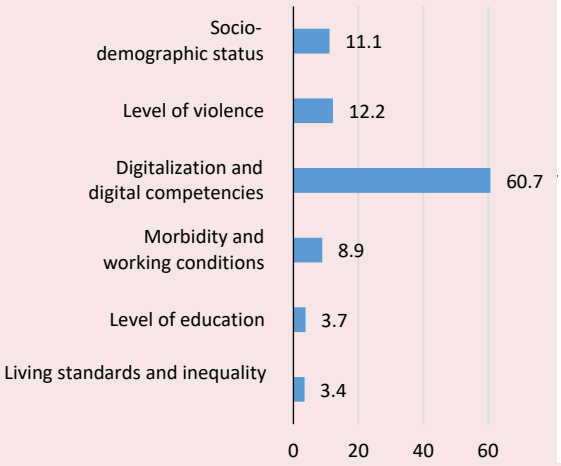
In 2021, the leading role in the formation of life expectancy of the economically active population was played by social risks *(Fig. 4a)* associated with digitalization and digital competencies of the population (60.7%), which is determined by the rapid transformation of the labor market as a result of the increasing trend toward remote work, as well as the intensive introduction of digital technologies in all spheres of social life. The importance of this social risk was so significant that it partially offset the risks of high levels of violence (up to 12.2%).

The importance of such social risks as socio-demographic status (11.1%), morbidity and working conditions (8.9%), as well as the level of education (3.7%) and standard of living (3.4%) remains. Let us focus separately on such a risk as the level of education – its negative contribution is associated with the fact that its structure includes indicators characterizing the prevalence of secondary vocational education and lack of vocational education. Thus, with the strengthening of this factor, the adaptation potential and life expectancy of the population decrease, which is reflected in the form of a negative correlation with LE_15 *(Fig. 4b)*.

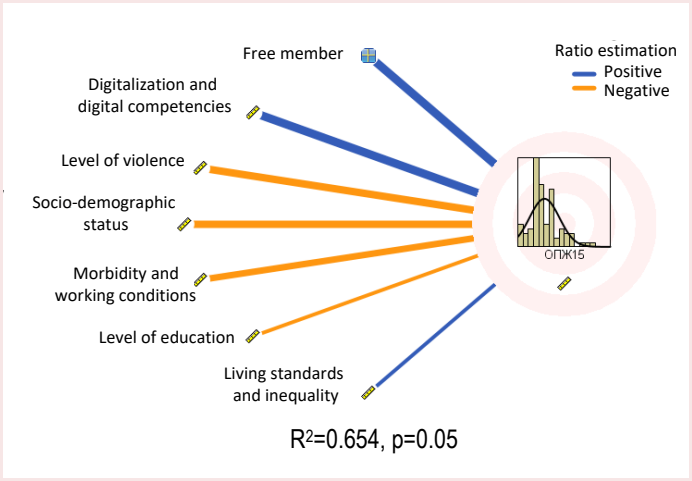
In 2022, the number of social risks that have a significant impact on the life expectancy of the economically active population decreased compared to the previous period (in regression modeling, the coefficients turned out to be statistically insignificant for part of the variables), and their structure approached the structure of 2019, when there was a fairly stable socio-economic situation in Russian regions *(Fig. 5)*.

The level of violence (53.7%) and digitalization (33.3%) demonstrate the greatest importance for the formation of life expectancy at the age of 15 in this period. Less important, but still significant social risks are socio-demographic status (6.8%), as well as socially significant diseases (4.3%). In addition, the influence of morbidity and working conditions remains (1.9%).

Figure 4. Regression modeling of the impact of social risks on life expectancy of economically active population of Russian regions in 2021



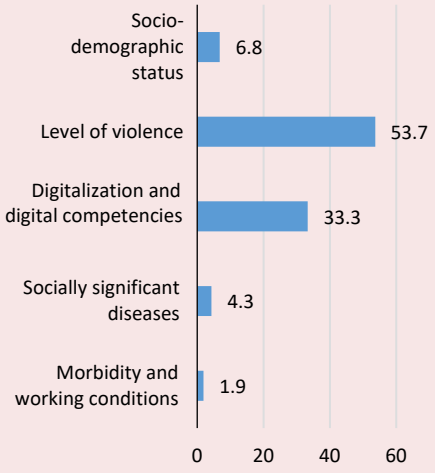
a) importance of social risks, %



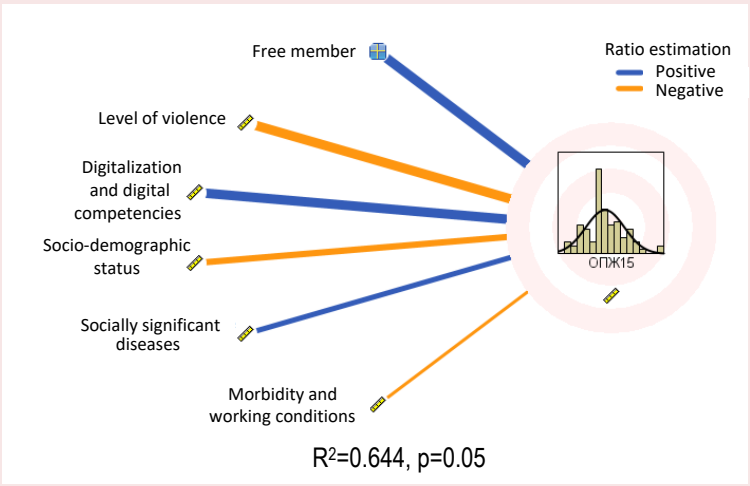
b) regression model

Source: own compilation based on Rosstat data.

Figure 5. Regression modeling of the impact of social risks on life expectancy of economically active population of Russian regions in 2022



a) importance of social risks, %



b) regression model

Source: own compilation based on Rosstat data.

Thus, we can draw several conclusions analyzing the diversity and importance of social risks affecting life expectancy at the age of 15. First, there is a set of social risks that have a significant and substantial impact on this indicator throughout the analyzed period. These include the level of violence in society, as well as socio-demographic status as the probability of falling into a vulnerable category of the population by socio-demographic characteristics (old age, having many children, unemployed status, etc.). The same group of risks includes the digitalization risk in terms of both the development of digital infrastructure and the formation of digital competencies of the population, as well as the level of morbidity and the quality of working conditions. In general, this group of social risks is associated with threats to physical security and social deprivation of the population as factors in reducing life expectancy.

In our opinion, the listed social risks are systemic in nature, as they are significant throughout the period under consideration and are inherently connected with the existing socio-economic relations. Reducing the negative impact of such risks should be carried out systematically at the state level in the context of the priorities of national socio-economic policy, which is reflected in the new national projects launched in 2025[7].

Second, we identified a group of social risks arising in crisis situations, such as those manifested during the pandemic of a new coronavirus infection. They include mainly economic risks associated with the threats of increasing poverty and inequality, as well as the low level of education as an additional risk of reducing the quality of life during the crisis phenomena in the socio-economic development of Russian regions. The listed social risks due to the nature of their occurrence and the transience of their impact can be called situational, and their leveling is associated with both point decisions of the state (e.g., a set of federal and regional measures of social support of the population in the context of the COVID-19 pandemic in 2020–2021[8]), and with the efforts of civil society aimed at supporting the population groups most vulnerable in a particular situation (the elderly, families with children, people with disabilities, unemployed citizens, and refugees).

The obtained results open up opportunities for further study of the structure and content of social risks, including the study over a longer period of time will make it possible to clarify systemic risks in the future, and by the example of other shocks (financial crisis, natural disasters, etc.) – to expand the understanding of situational social risks and measures to mitigate them.

Conclusion

The presented research is devoted to the identification of social risks, as well as to the assessment of their impact on the life expectancy, which depends not only on biological preconditions, but also on the population's ability to adapt to the growing uncertainty in the conditions of constant transformation of the external environment.

The exploratory study performed by factor analysis methods based on the indicators of socio-economic development of Russian regions in 2019–2022 allowed identifying specific social risks relevant for each year of the selected period of analysis. Subsequent regression modeling used the social risks identified by the results of the factor analysis as independent variables, and the life expectancy at the age of 15 as the dependent variable. As a result

[7] On the national development goals of the Russian Federation for the period up to 2030 and in the perspective up to 2036: Presidential Decree 309, dated May 7, 2024. Available at: https://www.consultant.ru/document/cons_doc_LAW_310251/1caf1bd3e1d25c87f89d45f48b5fc7f08cb5063a/ (accessed: January 13, 2025).

[8] Measures of the Government of the RF to combat coronavirus infection and support the economy. Available at: http://government.ru/support_measures/ (accessed: August 7, 2024).

of regression modeling, first, we determined the importance and direction of the influence of the identified social risks on the life expectancy of the economically active population, and second, we carried out a comparative analysis of individual time periods among themselves and revealed significant differences in the structure of actual social risks.

The conducted exploratory study shows that life expectancy of the economically active population is influenced by two groups of risks. Those social risks (the level of violence, socio-demographic status, working conditions and morbidity, socially significant diseases, digitalization) that retain a significant influence throughout the period under consideration and are included in all four regression models are defined by us as systemic, inherent in the established socio-economic system in Russian regions. Another group of social risks arising as a result of crisis phenomena in the economy and social sphere (for example, during a pandemic) and associated with the likelihood of a rapid decline in living standards and rising inequality, are labeled as situational risks. At the same time, their impact in the period of instability can be so significant that their importance becomes predominant in the short term.

The proposed approach to the classification of social risks predetermines, in our opinion, the necessary nature of regulatory impact to increase the life expectancy of the population: systemic social risks require systematic long-term strategic solutions aimed at overcoming these social phenomena and the gradual transformation of the socio-economic system as a whole, while situational social risks can be minimized by short-term point measures of mainly economic nature (e.g., in the case of the social and economic risks of the population of the Republic of Belarus, the social and economic system of the Republic of Kazakhstan).

Thus, the scientific novelty of the study is related to its exploratory nature and consists in clarifying the composition of actual social risks that affect the life expectancy of the economically active population in Russian regions in the period 2019–2022, as well as in the substantiation of two groups of social risks – systemic and situational, which allows making reasoned decisions to improve the life expectancy depending on the nature of the identified risks. The results obtained can be used in the formation of socio-economic policy in the country and its individual regions.

At the same time, we should note that social risks are not universal for different socio-demographic groups, which is partially confirmed by the results obtained, since socio-demographic status acts as a systemic risk and retains its importance in different years. In addition, despite the fact that the exploratory nature of the study determined a rather limited period for analysis, even such a short retrospective look allowed suggesting a high mobility of the structure of social risks both in terms of their number and their importance. This opens up opportunities for further research on this topic in terms of differentiation of social risks by population groups and their analysis over a longer time series.

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Dynamics and Age Structure of Migration Flows of Far Eastern Regions

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Abstract. Migration has long been the main reason for population decline in the Russian Far East. Taking into account a large number of methods and approaches to the analysis and assessment of population migration, we put forward an original methodology for assessing the parameters of population migration between pairs of regions of the Far East. Our methodology for estimating the number of migrants uses the method of age shifting (the component method) together with elements of the method of migration movement balance. In contrast to existing approaches to assessing migration mobility, our approach helps to obtain minimum migration values with a certain range of possible values that guarantee the preservation of population balance. Of particular interest is assessment of migration by age group in the COVID and post-COVID period. A comparative analysis of migration balance data based on official statistics and the values obtained by own calculations reveal a number of anomalies and tampering with official information on population number, birth rate and mortality in children and adolescents under

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15 years of age. We reveal an overestimation of the number of newborns in 2018–2021 in five regions of the Far East. In the pandemic years (2020–2021) we observe a small migration increase for population groups aged 17–19 and 20–29 from regions outside the Far East. Migration growth in the three leading regions (the Khabarovsk and Primorye territories and the Republic of Sakha) has age-specific features and changes over time.

Key words: migration, age structure, age shifting method, Far East.

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Introduction

The assessment of population migration is an important task that arises in the study of socio-economic processes at the regional, national and global levels. Based on data on migration flows, the demographic situation is projected, regional development scenarios are obtained, and national and regional programs are created. At the same time, official migration statistics are just calculated values, not without many shortcomings, visible errors, for example, due to delays in registering in-migrants or out-migrants, or obvious signs of manipulation (Vakulenko et al., 2011; Mkrtchyan, 2020; Andreev, Churilova, 2023). In addition, these values are usually rather generalized like the difference between the inward and outward flows of the population in a region without specifying the directions of these flows (Nazarov, Nosova, 2009; Safiullin et al., 2014). As a result, official information provides only a rough idea of migration, negating its practical and theoretical significance.

In most regions of the Russian Far East, the magnitude of migration outflow is comparable to mortality and is a powerful driver of depopulation (Ryazantsev et al., 2016; Motrich, 2017). An accurate description of the migration structure and its patterns for different regions by age, as well as its dynamics, can be used in the development of demographic policy, as well as measures within the framework of youth and family policies.

Migration processes in the Far Eastern regions differ (Moiseeva, Mishchuk, 2024), which is related to the natural, geographical, historical, economic, cultural, anthropological, and demographic characteristics of the territories under consideration. Despite the decrease in the migration's proportion of the total population decline in the Far East, the study of its nature, structure and patterns is an important prerequisite for a comprehensive assessment and projections of population change.

In this regard, along with traditional methods of demographic analysis, an original methodology for assessing the parameters of migration between the regions of the Russian Far East is proposed. The methodology is based on an analysis of population change by age caused by natural and migratory movements between various pairs of regions. Such migration estimates allow us to answer a number of questions, which is impossible when analyzing only net migration. In particular, if it is positive, territories contributing to the most intensive inflow or no inflow can be reasonably indicated. If it is negative, the most common destinations can be determined.

It should be noted that many researchers have attempted to directly assess migration between territories and identify its components and structure (Rybakovsky, Tayunova, 2019; Mishchuk, Ryazantsev, 2021; Rusanov, Chudinovskikh, 2022). Most studies, as a rule, are based on an analysis of not only population change presented in official statistics, but also of a number of additional factors. For example, the attractiveness of a destination is

assessed (Vasilenko, 2014; Vasilenko, 2015), which directly affects migration intensity and patterns. Special attention should be paid to works using a "gravity" approach to the analysis and assessment of migration (Vakulenko et al., 2011; Kozlova et al., 2014; Korepina, 2017; Khavinson, Kulakov, 2017), where the number of migrants depends on the distance between regional centers (Vakulenko et al., 2011) or the distance of settlements from each other (Kozlova et al., 2014). In addition, the "gravitation" between territories is influenced by various factors of socio-economic development (Vakulenko et al., 2011).

Interesting results were obtained when assessing migration between countries (Renski, Strate, 2013; Abel, 2013; Abel, Sander, 2014; Azose, Raftery, 2019; Gou et al., 2020). To find the coefficients of the corresponding migration matrix, the pseudo-Bayes and maximum likelihood estimates are used (Abel, 2013; Azose, Raftery, 2019). The works have shown how global migration patterns and structure have changed over the past 50 years (Abel, Sander, 2014; Gou et al., 2020). However, due to large evidence, only the change in the total number of migrants was analyzed, without decomposition by age or sex. It was found that during the study period, countries formed groups (clusters) within which the most intense population movement was noted. It has been shown that changes in these clusters occurred primarily due to the processes of globalization and the formation of a multipolar world (Gou et al., 2020).

If there are sufficiently detailed data on the population structure, as well as fertility and mortality rates, a more "direct" approach can be applied, based, for example, on the ideas of sectoral and territorial population balance (Edinak, Korovkin, 2014; Korovkin, Sinitsa, 2019). However, it requires comprehensive information about the structure of the population, indicators of its change, including not only data on fertility and mortality, but also on the territorial, sectoral, professional, etc. movement of the population (Edinak, Korovkin, 2014). Given sufficient information, this approach allows describing migration as accurately as possible and making some predictions.

This paper proposes a methodology (algorithm) for estimating the number of migrants using the cohort-component method (Whelpton, 1928; Nazarov, Nosova, 2009; Neverova, 2010; Neverova, Revutskaya, 2017; Clark, 2020), as well as the methodical ideology of the balanced territorial movement between coupled regions of the Russian Federation, but without specifying the factors influencing migration (Edinak, Korovkin, 2014). For each age and a certain year, population balance equations are composed between various pairs of regions, taking into account mortality and unknown migration between them. As a result, the issue of estimating the number of migrants is formulated as a purely algebraic problem, namely linear equations system with a highly sparse and ill-conditioned matrix. To solve such systems, there are a sufficient number of effective numerical methods based on orthogonal decompositions of matrices, the least square method and regularization (Bakhvalov et al., 2004; Il'in, Poznyak, 2004).

The aim of the work is to study the structure and dynamics of migration between pairs of regions of the Russian Far East based on the author's methodology for assessing migration activity.

The first part of the article analyzes the indicators of net migration of the Far Eastern regions based on various data (population, migration increase, mortality and net migration). The paper presents a comparative analysis of net migration based on official and calculated data.

The second part contains calculations and results of assessing the intensity of migration between various regions of the Far East and the rest of the Russian Federation, as well as between pairs of regions of the Far East. At this stage, elements of graph theory, matrix theory, as well as numerical methods for solving systems of linear algebraic equations are used.

The third section presents quantitative estimates of migration by age group between the regions of the Far East.

The paper analyzes data on migration within the Far East, including between pairs of its regions, as well as net migration with other regions of Russia. The proposed approach does not assess migration flows between the Far East and foreign countries. The changes in migration of different population groups in the COVID and post-COVID periods are considered separately. The empirical part of the work includes data analysis for 11 regions of the Russian Far East.

Initial data and calculation of the total net migration

According to the cohort-component technique (Whelpton, 1928; Nazarov, Nosova, 2009; Neverova, 2010; Neverova, Revutskaya, 2017; Safiullin et al., 2014; Clark, 2020), the populations of adjacent cohorts (excluding newborns) are related by the following equation:

$$N_i(t,k) = N_i(t-1,k-1) - D_i(t-1,k-1) + M_i(t-1,k-1), \quad (1)$$

where $N_i(t,k)$ is the population of the k age ($k = 1, 2, ..., 100$) at the beginning of the t year, D_i is the number of deaths for the entire t year, M_i is the migration inflow for the same period (net migration) equal to the difference between the number of arrivals and departures, i index is the number of the territory (region). For the number of children under one year of age, we have the following equation:

$$N_i(t,0) = B_i(t-1) - D_i(t-1,0) + M_i(t-1,0), \quad (2)$$

where B_i is the number of children born in the entire t year, D_i is infant mortality.

The simplest analysis of the migratory movement can thereby be carried out using data on the age composition (population of each age), as well as the parameters of the natural movement of the population (fertility and mortality). We will conduct this analysis for 11 regions of the Far East. As initial data, we will use information from the Federal State Statistics Service, including the population by sex and age as of January 1, 2012–2022 (based on the results of the 2020 All-Russian Population Census), as well as Rosstat data on mortality and fertility for the period 2016–2023[1].

Solving equations (1) and (2) with respect to an unknown value M, it is easy to estimate net migration. But since the population data based on the Census results are, in fact, calculated, the found values of M are equal to the migration values that the Federal State Statistics Service has included in the population calculation. Therefore, it will be interesting to compare these very values with data on migration increase from the official statistics portal of Rosstat[2]. Additionally, we will use Rosstat data on mortality and net migration, decomposed by sex and age[3].

The result of net migration assessment for some regions of the Far East and several years of observation is shown in *Figures 1 and 2*. For most regions, there is no significant difference between official data and migration indicators calculated using the cohort-component method (based on equations (1) and (2)). Although, according to calculations, migration turned out to be 15–30% higher than the official one, the age distribution (inward or outward flows and their change in adjacent ages) coincides quite well in general.

However, for a number of regions and some age groups, anomalies have been identified, manifested in the discrepancy between calculated and official migration in certain years and in certain age groups *(Fig. 1)*.

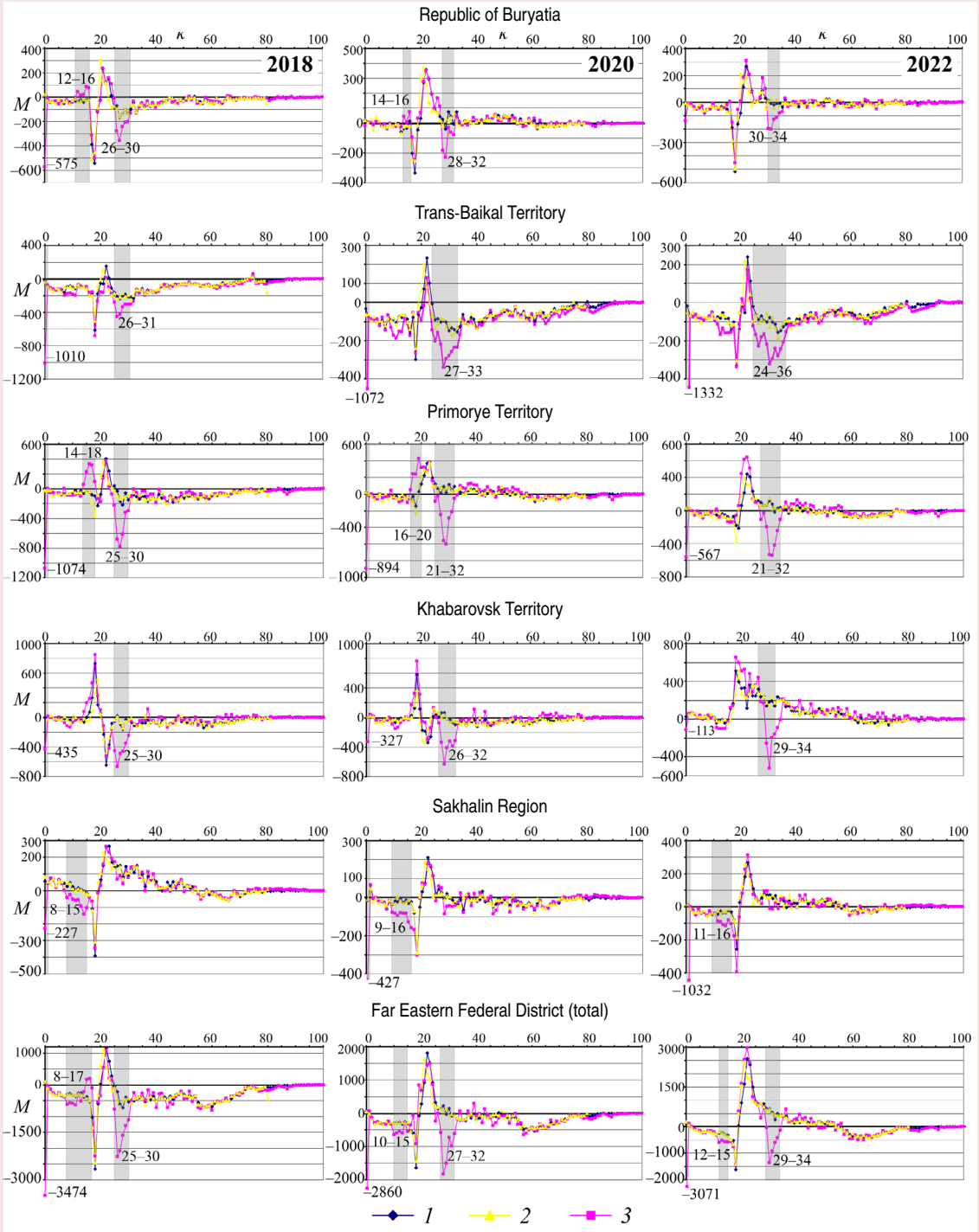
The first and most significant anomaly is associated with an overestimation of the number of newborns in 2018–2021 in five regions (Khabarovsk Territory, Primorye Territory, Sakhalin Region, Republic of Buryatia, Trans-Baikal Territory). A significant overestimation of the number of children under

[1] Official statistics. Population. Demographics. Federal State Statistics Service. Available at: https://rosstat.gov.ru/folder/12781 (accessed: July 9, 2024).

[2] Migration increase by sex, age and bilateral flows. Federal State Statistics Service. A showcase of statistical data. Available at: https://showdata.gks.ru/report/278004/ (accessed: July 9, 2024).

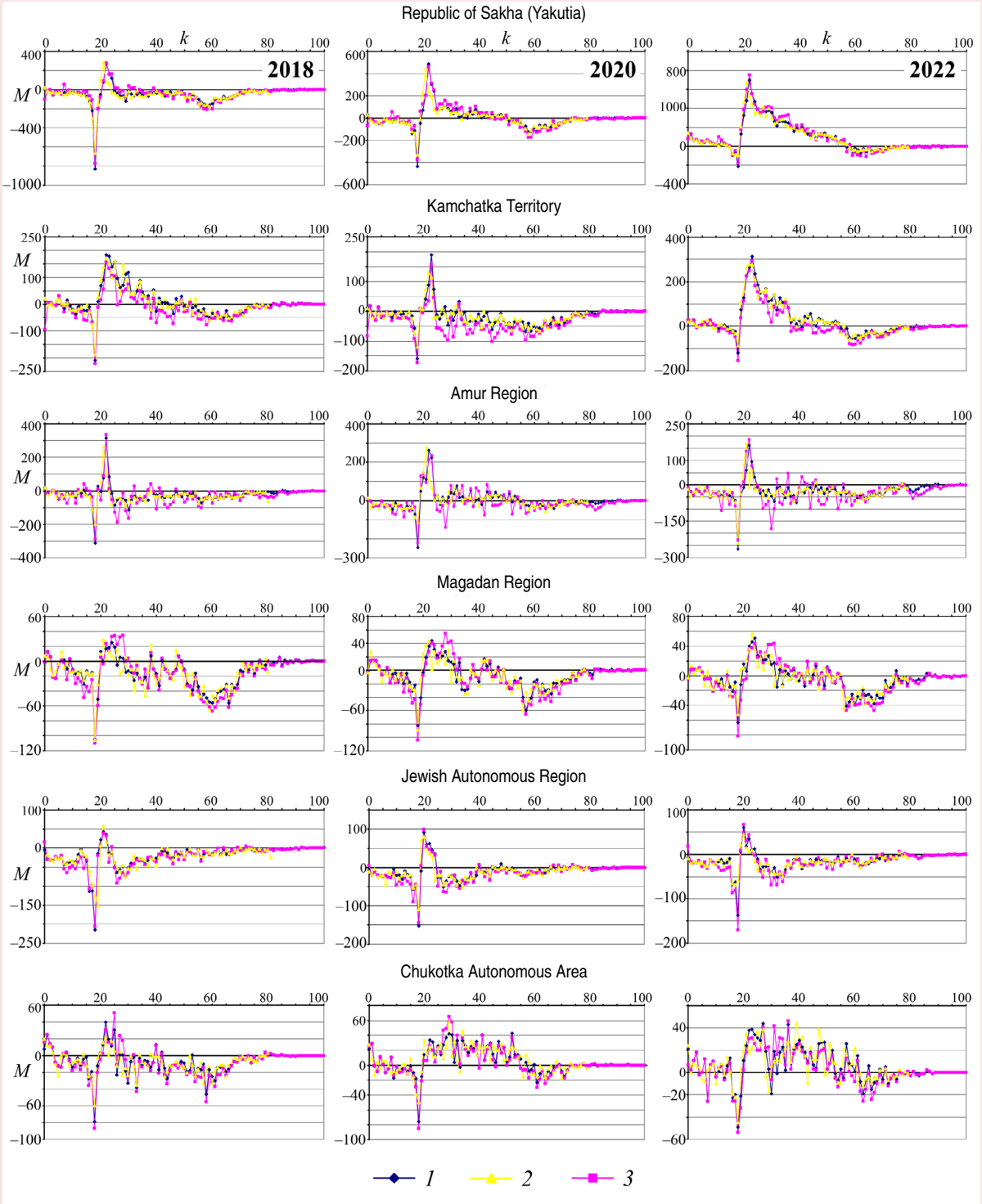
[3] The data was provided by Rosstat upon official request.

Figure 1. The net migration value *M* for population groups aged *k* (*k* = 0, 1, 2, ...100) in 2018, 2020 and 2022, for the regions of the Far East with the most noticeable difference between official and calculated migration



1 – data from the Rosstat statistical book (Migration increase by sex, age and bilateral flows. Federal State Statistics Service. A showcase of statistical data. Available at: https://showdata.gks.ru/report/278004/ (accessed: July 9, 2024)), 2 – Rosstat data on request, 3 – own calculation using the cohort-component method. The gray rectangle indicates ages with significant discrepancies in migration estimates.

Figure 2. Comparison of official migration data with calculated data for the regions of the Far East



1 – data from the Rosstat statistical book (Migration increase by sex, age and bilateral flows. Federal State Statistics Service. A showcase of statistical data. Available at: https://showdata.gks.ru/report/278004/ (accessed: July 9, 2024)), 2 – Rosstat data on request, 3 – own calculation. The X-axis is age (k = 0, 1, 2, ...100), the Y-axis is the net migration value M.

1 year old has led to the fact that the actual infant mortality rate is not able to explain such a rapid decrease in the number of children next year. As a result, the value of M(t,0) in equation (2) is always negative for these regions and 2–20 times higher than the official estimate. There may be several explanations for this discrepancy.

For example, the regions of the Far East are characterized by a significant medical gap in terms of pregnancy, and women often go and give birth in neighboring regions with a more developed healthcare system. As a result, newborns are registered in one region, but mothers with children quickly return to their region, where re-registration is possible. Indeed, for regions where there is no overestimation of the number of newborns (and, respectively, no overestimation of the net newborns number), there is a slight excess of net migration for children aged 1 over the official data. However, numerically, this excess is not able to fully explain the anomalies in newborn migration. In addition, a number of researchers note that the high negative migration obtained according to the All-Russian Census is associated with the common use of administrative data on those who do not participate in the Census personally. According to (Andreev, Churilova, 2023), the proportion of such people is high for some "problematic" regions (Khabarovsk and Primorye territories) of the Far East and correlates well with the proportion of people with the unknown level of education and marital status.

The second anomaly, which has no obvious and simple explanation, is related to the positive estimated inflow of teenagers in the Republic of Buryatia (12–18 years) and the Primorye Territory (14–18 years) in 2018–2019. According to official data, these ages are characterized by near-zero migration or even a small outflow. On the one hand, among older teenagers (16–18 years) there may be applicants for secondary and higher education institutions from other regions, who were not officially registered at that time. It should be noted that since 2020 net migration is at a similar rather high positive peak among young people aged 18–20 which does not contradict official data, i.e. they could have arrived in these regions earlier, but were registered later after reaching majority. Or, more likely, when recalculating the results of the Census, they were "mistakenly" counted as having migrated several years earlier. This is confirmed by the fact that in earlier periods, the peak inflow of teenagers is shifting to younger ages, while by 2022 it corresponds to the age of 20–22 years. In addition, adolescents aged 12–16 in 2018–2019 and earlier could not migrate to these regions independently without their parents. However, during this period, there was no positive inflow of adults who could be their parents or guardians (persons aged over 30 years). After 2020 though, an inflow of such adults has been observed, but there is no similar inflow of children. Perhaps, in the period 2018–2019, migration of families with children to these regions could indeed have taken place, but children alone were taken into account, and adults were considered only according to the results of the All-Russian Census in 2020.

A similar situation is typical for the Sakhalin Region: according to official data, in 2018–2022 there was an inward flow of children and adolescents of all ages, quite synchronously with the inflow of the adult population, i.e. people who may be their parents (19 years and older). However, there is a significant difference between the calculated and official migration data – for children aged 8–16, the estimated net migration is negative, while the official one is positive. Perhaps there was an underestimation of the departure of their parents, which was not clarified according to the results of the Census after 2020.

The third feature, which, unlike others, cannot be called an anomaly, is observed in the Khabarovsk, Primorye, Trans-Baikal territories and the Republic of Buryatia. It manifests itself in a significant difference between the official and estimated net migration in population aged 25–30

in the period 2017–2022. The calculation indicates that there was a large outflow during this period, while official statistics show slightly negative or even positive values. This discrepancy can be explained by the fact that, being the most mobile, this group of the population is not counted for a long time after leaving as having actually changed their place of residence, while arrivals providing a positive or close to zero value mainly consist of migrants who have to be registered (international migrant workers).

The last feature of the data is related to a one-year shift in the distribution peaks of estimated and official net migration for most regions of the Far East. This shift can be explained by migrant registration delays. Moreover, the larger the population of the region, the more noticeable this and the previous features are. For other regions, there is no significant difference between official and calculated statistics (Fig. 2).

It can be thereby assumed that, despite the noted anomalies, the estimated values of net migration for all 11 regions in the time period under review generally better describe the real situation than the official data, and also capture some unobvious trends in population migration. So, for further analysis the calculated data are used. We will focus on the ages with the most reliable migration data and those of particular interest – people over the age of 16.

Calculation of net migration between pairs of regions

The migration figures presented above for a particular region reflect only the final result of migration exchange between all regions of the Russian Federation, without specifying the directions and intensity of flows. In this regard, it is interesting to assess the intensity of migration between various pairs of regions of the Far East and the rest of the Russian Federation. To do this, we apply elements of graph theory, matrix theory, as well as numerical methods for solving systems of linear algebraic equations.

To begin with, let us make a significant assumption, namely that the sum of net migration of all the Far Eastern regions is equal to net migration with the rest of the Russian Federation, but with a minus sign. In this case, we believe that international migration is included in the intra-Russian migration, which is quite justified, since the population of the Russian Federation without the Far East is more than 17 times larger than the Far Eastern population. This assumption leads to the fact that emigrants from the Far East who move to other countries first enter territories outside the Far East, increasing the population there, and only then leave the territory of the Russian Federation. Similarly, immigrants from other countries move to the Far East in transit through other Russian regions. This will undoubtedly cause discrepancies in population figures when assessing migration (primarily for territories outside the Far East), which will indirectly indicate the magnitude of international migration. However, this assumption will greatly simplify the analysis and make it possible to use a minimal dataset.

With this formulation of the problem, the Far Eastern regions and the rest of Russia can be described as a complete oriented graph with $n = 12$ vertices and $p = n(n-1)/2 = 66$ edges. It is interesting then to evaluate the connectivity of such a graph, to find out if there are any typical directions within it (routes), whether there are closed paths on it and how they change over time for different cohorts. To do this, it is necessary to evaluate the connection strength (edge weight) between each pair of regions (vertices).

As before, we will denote net migration in the t year of the population aged k by $M_i(t,k)$, where the index $i = 1, 2, 3, ..., n = 11$ corresponds to the number of the Far Eastern region; $M_{12}(t,k) = -\sum_{i=1}^{11} M_i(t,k)$ – net migration between the Russian Federation and the Far East. The regions are numbered as follows: 1 – Republic of Buryatia, 2 – Trans-Baikal Territory, 3 – Republic of Sakha (Yakutia), 4 – Kamchatka Territory, 5 – Primorye

Territory, 6 – Khabarovsk Territory, 7 – Amur Region, 8 – Magadan Region, 9 – Sakhalin Region, 10 – Jewish Autonomous Region, 11 – Chukotka Autonomous Area, 12 – Russian Federation excluding the Far East.

It is easy to understand that each of the values of M_i (i = 1, 2, ..., 12) is equal to the sum of net migration between all pairs of regions. We will use m_{ij} to denote the result of population movement between the i and j regions. Let us call this value a paired net migration. It is clear that $m_{ij} = -m_{ji}$, i.e. the results of population movement between the i and j territories will be opposite – the population will be increased by m_{ij} for one region and decreased by m_{ij} for the other. Consequently, the total net migration of the 11 regions under consideration (i = 1, 2, 3, ..., 11) and the rest of the RF (i = 12) is equal to:

$$\begin{aligned}
M_1 &= m_{1,2} + m_{1,3} + m_{1,4} + \ldots + m_{1,12},\\
M_2 &= -m_{1,2} + m_{2,3} + m_{2,4} \ldots + m_{2,12},\\
M_3 &= -m_{1,3} - m_{2,3} + m_{3,4} + \ldots + m_{3,12},\\
M_4 &= -m_{1,4} - m_{2,4} - m_{3,4} + \ldots + m_{4,n},\\
&\ldots\\
M_{11} &= -m_{1,11} - m_{2,11} - \ldots - m_{10,11} + m_{11,12},\\
M_{12} &= -m_{1,12} - m_{2,12} - \ldots - m_{10,12} - m_{11,12}.
\end{aligned} \qquad (3)$$

Relations (3) define a system of n = 12 linear algebraic equations with p = 66 unknowns. In this case, the system (3) is underdetermined and ill-conditioned. This leads to a situation where small changes of the M_i values make the system incompatible, meaning that it ceases to have an exact solution. However, it is easy to show that while maintaining zero net migration between all territories, i.e. $\sum_{i=1}^{12} M_i = 0$, the system will always be compatible (the rank of the matrix A, consisting of coefficients before the unknown m_{ij}, is 11 and equal to the rank of the expanded matrix ($A|M$)). As a result, the system of linear algebraic equations (3) has an infinite number of exact solutions belonging to the hyperplane of dimension 55.

Despite these difficulties, it is possible to numerically find a set of solutions to system (3) using additional assumptions. To solve system (3), we use the QR decomposition, which transforms a highly sparse matrix A (consisting mainly of zeros) to an orthogonal and upper triangular matrix (Bakhvalov et al., 2004). This will allow distinguishing the basic and free unknowns of the system (3). Next, we perform multiple generation of free unknowns belonging to the valid section of the hyperplane. Obviously, a priori information about the possible limits of the net migration values for a pair of regions is required here. It is quite reasonable to assume that the migration coefficients (the proportion of those who left) do not exceed the value $\overline{w}_{ij} = 0.01$, i.e. $|m_{ij}| \le \overline{w}_{ij} |N_j - N_i|$. This means that at least one in 100 persons is potentially ready to migrate to another region. In addition, this proportion is higher the more the difference in the population of the two regions.

Each set of unknowns generated in this way is used as a starting point in gradient descent. As a result, the free unknowns and, according to them, the basic unknowns are found that minimize the residual $\|Am_{ij} - M\| \to 0$. To improve conditionality, Tikhonov regularization is performed (Il'in, Poznyak, 2004), i.e. an optimization problem $\|Am_{ij} - M\| + \lambda \|m_{ij}\|^2 \to \min$ is solved, where $\lambda \le \overline{w}_{ij} / |N_j - N_i|$.

As a result, each of the generated initial conditions (200 units) corresponds to 66 values of m_{ij} for a pair of territories, which are a fairly accurate solution to system (3) (the residual does not exceed 10^{-12}). It is clear that the set of these 200 solutions is somehow distributed over a valid section of the hyperplane. Let us estimate its possible boundaries. To do this, we will determine the variation limits in the values of the paired net migration, as well as estimate their average value (center of mass) and its range (standard deviation).

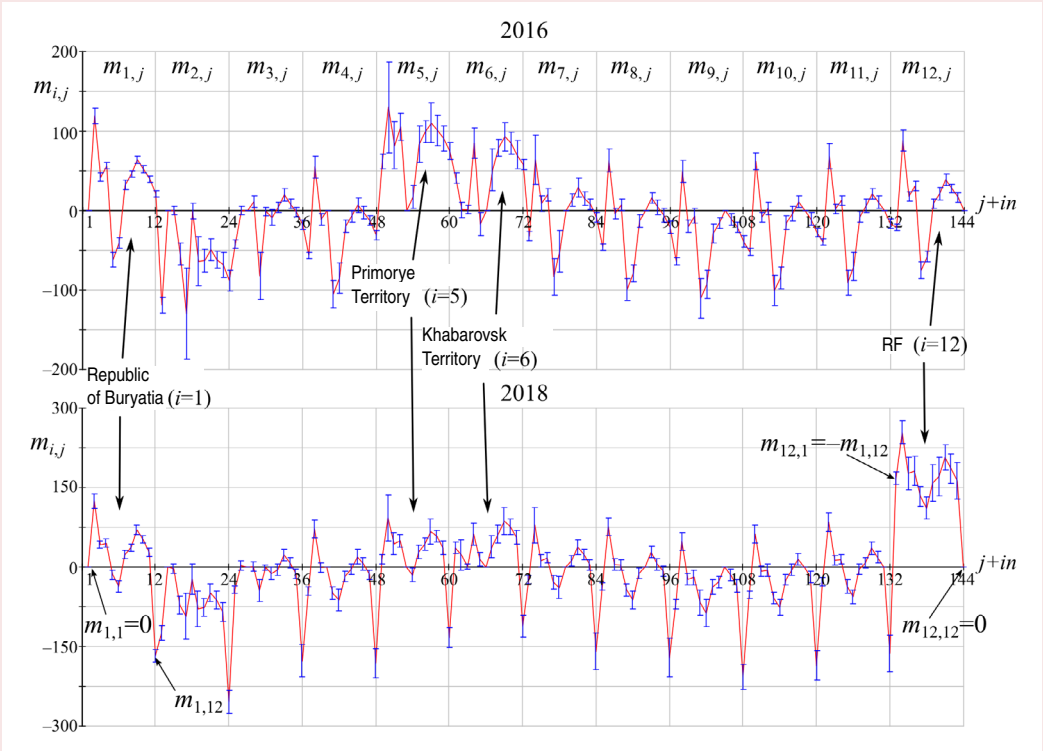
As part of our work, we analyze data from 2016 to 2022. For each of the 101 ages, 66 values of m_{ij} were obtained ($m_{ij} = -m_{ji}$, $m_{ii} = 0$). Therefore, it is logical to combine data from several ages into

groups (cohorts) and consider migration estimates for them. *Figures 3 and 4*, for example, show graphs of net migration values for three age groups: 10–16, 17–19, and 20–29 in different years.

Figure 3 shows the general nature of the solutions of system (3), where the values of its unknowns are duplicated using the equalities $m_{ij} = -m_{ji}$ and $m_{ii} = 0$ to make the interpretation easier. As a result, the net migration values for each of the regions under consideration with the remaining territories are put in the graphs between the vertical gray lines. Each peak of the positive net migration of the territory number i corresponds to a negative peak of the territory number j ($m_{ij} = -m_{ji}$). In Figure 3, this is highlighted for the first and last territories.

As can be seen from the graphs, the possible range (standard deviation) of the paired net migration value is not related to the average value of m_{ij}. As a rule, it is higher for pairs of territories that differ significantly in population. For example, all regions have a strong range in estimating the net migration with the rest of the Russian Federation, due to the large difference in population. In this case, the standard deviation may indicate the significance (reliability) of the obtained average paired net migration value. It is clear that if the range does not cross the X-axis, then for each of the 200 solutions of system (3), the value m_{ij} retains its sign. So, for pairs of territories with these numbers, the direction of migration from one generation of the initial estimate to another does not change

Figure 3. Values of the net migration m_{ij} of pairs of territories with numbers i and j using the example of a 10–16 age group in 2016 and 2018



The continuous line is the average value of m_{ij}, the vertical segments are the standard deviation. The X-axis is the ordinal number of the magnitude m_{ij}, the Y-axis is its value.

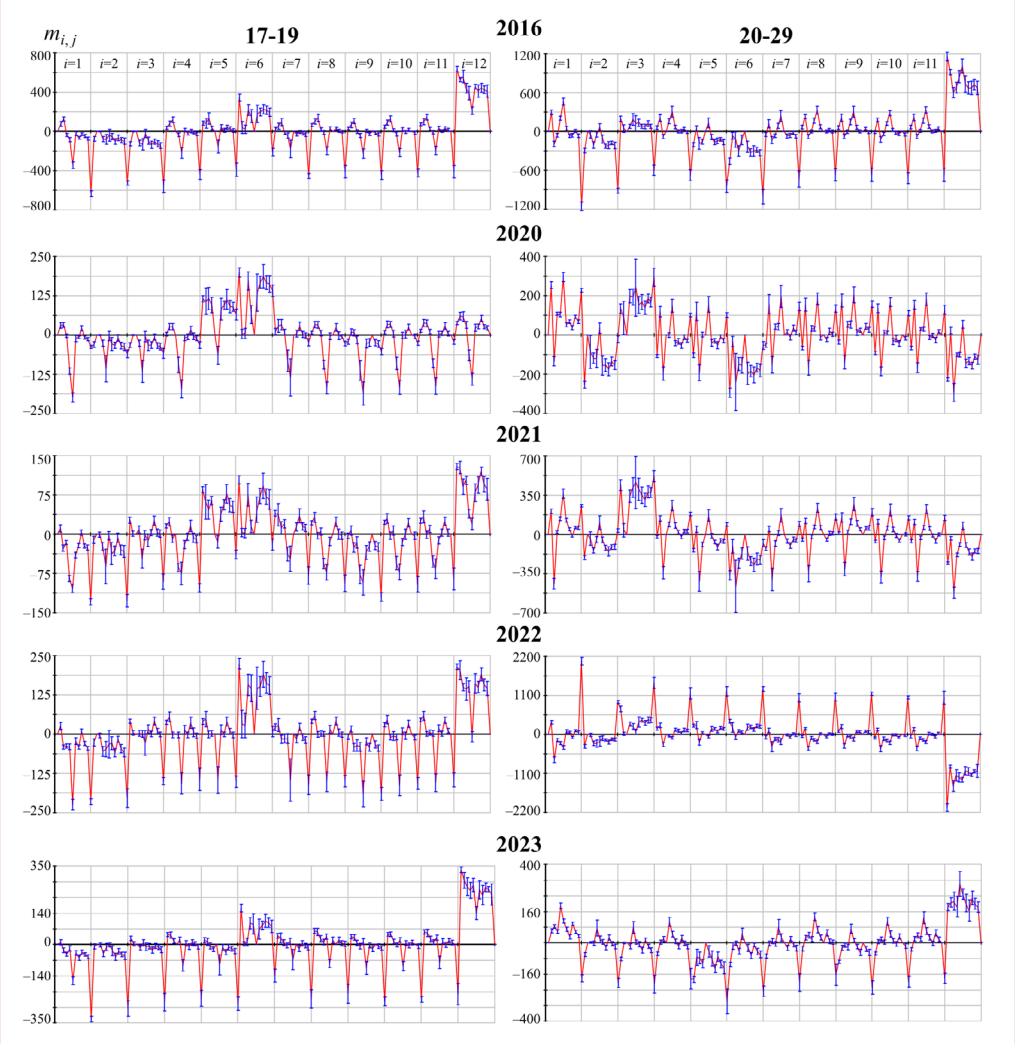
Source: own calculation.

qualitatively. If the range of possible values crosses the axis and, moreover, the value of m_{ij} is close to zero, then different solutions correspond to inactive migration with opposite flows for different solutions. As a result, the reliability of such an estimate of the m_{ij} value decreases significantly, and uncertainty arises about the true migration flow. Apparently, this can be interpreted as an extremely weak connection between a pair of territories. This assumption will be used below to estimate the specific number of migrants between regions.

Despite this, in most cases the standard deviation still lies above or below the X-axis, and reliability of the paired net migration m_{ij} estimates is beyond doubt. The analysis of the variation of these values for some age groups in different years (Fig. 4) allows us to draw a number of preliminary conclusions.

Figure 4 shows how migration activity has changed between the regions of the Far East for the two most mobile cohorts. The first group includes school graduates and applicants, the

Figure 4. The change in the paired net migration from 2016 to 2023 for age groups 17–19 and 20–29 years



The X-axis is the ordinal number of the variable m_{ij}, the Y-axis is its value.
Source: own calculation.

second group includes graduates of secondary and higher educational institutions, as well as young professionals.

A peculiarity of the Far Eastern regions is the high migration activity of these particular age groups, as well as the fact that many of the highly desirable secondary and higher educational institutions are located in three regions: the Primorye Territory ($i = 5$), the Khabarovsk Territory ($i = 6$) and the Amur Region ($i = 7$). These regions are a destination for a significant flow of young people aged 17–19. However, the main stream of youth is directed outside the Far East (more than twice as large). Considering the paired net migration estimates, it can be seen that the flow of young people is quite heterogeneous. For example, the Khabarovsk Territory (leading in receiving youth) has almost no migrants from the Trans-Baikal Territory ($i = 2$) and the Republic of Sakha ($i = 3$) ($m_{6,2}$ and $m_{6,3} \approx 0$, the standard deviation crosses the X-axis). The young people of these regions mostly move between neighboring regions, including the Republic of Buryatia ($i = 1$). However, of these three regions, the largest flow of young people is directed to the Primorye Territory ($i = 5$), partly to the Amur Region. Interestingly, youth aged 17–19 mostly come from the Primorye Territory to the Khabarovsk Territory (as well as outside the Far East), which has the least flow to other regions of the Far East and beyond.

It can be seen from the graphs that the nature of migration of youth aged 17–19 has changed significantly over the marked period of time. This is especially noticeable in the years of the COVID-19 pandemic (2020–2022), when the inflow of young people to the Primorye and Khabarovsk territories and the Amur Region significantly decreased (more than 2-fold). In 2020, the inflow to Russia has become almost zero. Migration rates of this age group reached the level of 2016–2018 only by 2023.

The graphs in Figure 4 show that the second age group (20–29 years) has partly opposite migration trends. It can be concluded that some of the young people return to their native regions after their studies. It is challenging to analyze this age group due to the necessity of comparing migration data for different periods of time, since, first, the study period ranges from three to six years (depending on the student's major) and young people return after this period of time. In addition, there is a certain delay in registering such departure and then arrival. Second, the group of those who left these regions (the Khabarovsk and Primorye territories), but remained in the Far East, consists not only of yesterday's nonresident students, but also of local specialists who find jobs in other regions of the Far East.

It can be seen from the graphs in Figure 4 that the maximum out-migration of the population aged 20–29 from the Khabarovsk and Primorye territories in 2020–2021 is directed to the same territories from which there was previously a reverse migration of the cohort of 17 to 19 years old in 2016–2017. But it turns out to be about 1.5 times less than the initial inflow. However, it must be considered that those who have left the two territories are not only graduates, and the return of young specialists is at best only half of what is possible. Such an outflow is not typical for the Amur Region.

In the pandemic years (2020–2022), there was an in-migration of representatives of this age group from territories outside the Far East, and the outward flow that was previously usual for the Khabarovsk and Primorye territories changed to an inflow from almost all territories of the Far East. Interestingly, the main destination territory was the Republic of Sakha (Yakutia) that year. After 2022, migration of the population aged 20–29 returned qualitatively to pre-pandemic levels.

Estimation of the number of migrants between pairs of regions

The value of net migration for each pair of territories depends on the population size in the following obvious way:

$$m_{ij} = w_{ij} N_j - w_{ji} N_i, \quad (4)$$

where $0 \le w_{ij} < 1$ is the migration coefficient (coupling strength) of the *i* region with the *j* region, equal to the proportion of the considered age group of the *j* territory that migrates to the *i* territory. The first member of sum (4) is equal to the number of in-migrants of the *i* territory, the second member denotes its out-migrants. It is clear that in the general case $w_{ij} \neq w_{ji}$, unlike the values of the paired net migration ($m_{ij} = -m_{ji}$), which complicates their assessment. In this case, we have 66 completely unrelated equations (4) with 132 unknowns w_{ij}. Therefore, the values of w_{ij} can take any values within acceptable limits (from 0 to 1) and it is impossible to narrow their variation range.

It is clear from the properties of linear equation (4) that the migration coefficients w_{ij} and w_{ji}, depending on the value of m_{ij} and its sign, can be within the following limits:

$$w_{ij}^0 = \max\left(0, \frac{m_{ij}}{N_j}\right) \le w_{ij} < w_{ij}^1 = \min\left(1, \frac{m_{ij} + N_i}{N_j}\right) \text{ and}$$

$$w_{ji}^0 = \max\left(0, -\frac{m_{ij}}{N_i}\right) \le w_{ji} < w_{ji}^1 = \min\left(1, \frac{N_j - m_{ij}}{N_i}\right). \quad (5)$$

It follows from this that the true values of migration coefficients for some territories may be zero, for others – rather small values equal to the ratio of net migration to the population, and for others – very large values. In the lower limit, if the migration coefficient for one territory is zero, then for the other it is equal to m_{ij}/N_j or $-m_{ij}/N_i$, depending on the net migration sign. In the upper limit, if one of the migration coefficients is equal to 1, then the other is equal to $(m_{ij} + N_i)/N_j$ or $(N_j - m_{ij})/N_i$.

It is clear that all 132 coefficients cannot simultaneously assume the maximum value determined by inequalities (5), since this contradicts the assumption made when estimating the size of the paired net migration: $|m_{ij}| = |w_{ij}N_j - w_{ji}N_i| \le \overline{w}_{ij}|N_j - N_i|$, where $\overline{w}_{ij} = 0.01$. Under this assumption, individual w_{ij} values may be more than 0.01 due to the large difference in numbers. However, high values of migration coefficients will necessarily be offset by zero or close to zero values of other coefficients.

It is important that for a qualitative description of the relationship's nature, including a description of the directions of migration flows from one region to another, it is possible to simply use the lower limits of inequalities (5), i.e. $w_{ij} = w_{ij}^0$, $w_{ji} = w_{ji}^0$. Such minimal migration can be found, for example, in the work (Azose, Raftery, 2019) in which international migration between pairs of countries was assessed using slightly different methods. In addition, lower limits will allow us to take into account the situation when the range of possible values of the paired net migration falls on both sides of the X-axis.

Considering that the distribution of the paired net migration values obtained from random initial conditions is normal (according to Pearson's chi-squared test), in the case of a large range of sample values that overlap zero values, the estimate of the sample mean m_{ij} randomly differs from zero (according to Student's *t*-test). In this case, if $m_{ij}^2 \le \sigma^2$ (σ is the standard deviation of the m_{ij} average value estimate), then it can be reasonably argued that $m_{ij} = 0$ and $w_{ij} = w_{ji} = 0$. However, "setting to zero" some values of the paired net migration will disrupt the balance of the number of migrants, and the remaining non-zero values for which $m_{ij}^2 > \sigma^2$ will not satisfy the system (3). Therefore, it is necessary to clarify the remaining only non-zero values. To do this, we set the coefficients preceding the unknowns of system (3) equal to zero if $m_{ij}^2 \le \sigma^2$ was true at the first iteration. As a result, we get a slightly sparse matrix *A*, the rank of which is equal to the rank of the expanded matrix and is 11. We apply the *QR* decomposition for it and solve the corresponding optimization problem in the way described in the previous part.

The solution to the new system of linear algebraic equations is also a set of 66 values of m_{ij}, some of which ("set to zero" if the condition $m_{ij}^2 \le \sigma^2$ is met) can take absolutely any value, since they are preceded by zero coefficients. In order for this whole set to satisfy the initial system (3), they must be only equal to zero. As a result, we can assume that for non-zero values of the paired net

migration $m_{ij} \neq 0$, the lower estimate of migration coefficients is determined by the lower limit of inequalities (5), and for $m_{ij} = 0$ $w_{ij} = w_{ji} = 0$, i.e.

$$w_{ij} = \max\left(0, \frac{m_{ij}}{N_j}\right) \text{ и } w_{ji} = \max\left(0, -\frac{m_{ij}}{N_i}\right), \quad (6)$$

where m_{ij} is the values of the paired net migration of the new system of linear algebraic equations with partially set to zero coefficients.

The quality of the estimates of migration coefficients obtained can be assessed using the residual between the real $N(t,k)^*$ and the model number $N(t,k)$, determined by a difference equation of the form:

$$N(t,k) = W(t-1,k-1)N(t-1,k-1) - D(t-1,k-1), \quad (7)$$

where N is the vector of population sizes, D is the vector of the number of deaths at the age of k in the year t in each of the 12 territories in question; $W = (w_{ij})_{i,j=1}^{n}$ – migration matrix consisting of migration coefficients w_{ij}, on the diagonal of which is the proportion of the remaining part of the population after out-migration, i.e. $w_{jj} = 1 - \sum_{i=1, i\neq j}^{n} w_{ij}$.

The residual (error), defined as the Euclidean norm $\left|N(t,k) - N(t,k)^*\right|$, has a relatively small value for all years of observation and all ages. A component-wise analysis of the vectors $N(t,k) - N(t,k)^*$ shows that for the Far Eastern Federal District regions, if the paired net migration rounded to integers, $\left|N_i(t,k) - N_i(t,k)^*\right| \leq 3$ for i = 1, 2, ..., 11, i.e. the Far Eastern Federal District regions are short in the accounts by no more than three people according to model (7). Without rounding up the number of migrants, this difference is quite small ($\left|N_i(t,k) - N_i(t,k)^*\right| \leq 10^{-6}$ for i = 1, 2, ..., 11). However, in both cases, the difference $N_{12}(t,k) - N_{12}(t,k)^*$ between the model and the real population of the Russian Federation, excluding the Far East (i = 12), is consistently high, reaching 10–15 thousand people in some years and for different ages. Such a high difference is primarily due to a rather rough estimate of the number of deaths outside the Far East. In this case, the last component of vector D_{12} of equation (7) is obtained on the basis of the average age-related mortality rates presented in official statistics for five-year cohorts throughout the Russian Federation. In addition, the study describes Russia as a closed system of 12 coupled territories without taking into account external migration. As a result, the difference between the model and real numbers contains not only inaccurate mortality data, but also international migration and naturalization processes which are not taken into account.

Similarly, we can compare the difference between the vector of model $M(t,k)$ and real $M(t,k)^*$ net migrations. In the case of rounding m_{ij} to integers $\left|M(t,k) - M(t,k)^*\right| \leq 3$, without rounding $\left|M(t,k) - M(t,k)^*\right| < 10^{-6}$.

From the obtained values of migration coefficients, it is easy to calculate the number of in-migrants ($w_{ij}N_j$) and out-migrants ($w_{ji}N_i$) for each i territory. To do this, we define a matrix $P = (p_{ij})_{i,j=1}^{n}$, where

$$p_{ij} = \begin{cases} w_{ij}N_j, i \neq j, \\ (1 - w_{ij})N_j, i = j. \end{cases} \quad (8)$$

The row of the matrix P with the number i (except the diagonal) contains the number of people who came to the i territory from the j territory ($i \neq j$). In the column, respectively, it is the number of those who left the j territory for the i territory ($i \neq j$). On the diagonal P is the total number of people who left this territory for all the others.

Migration estimates analysis

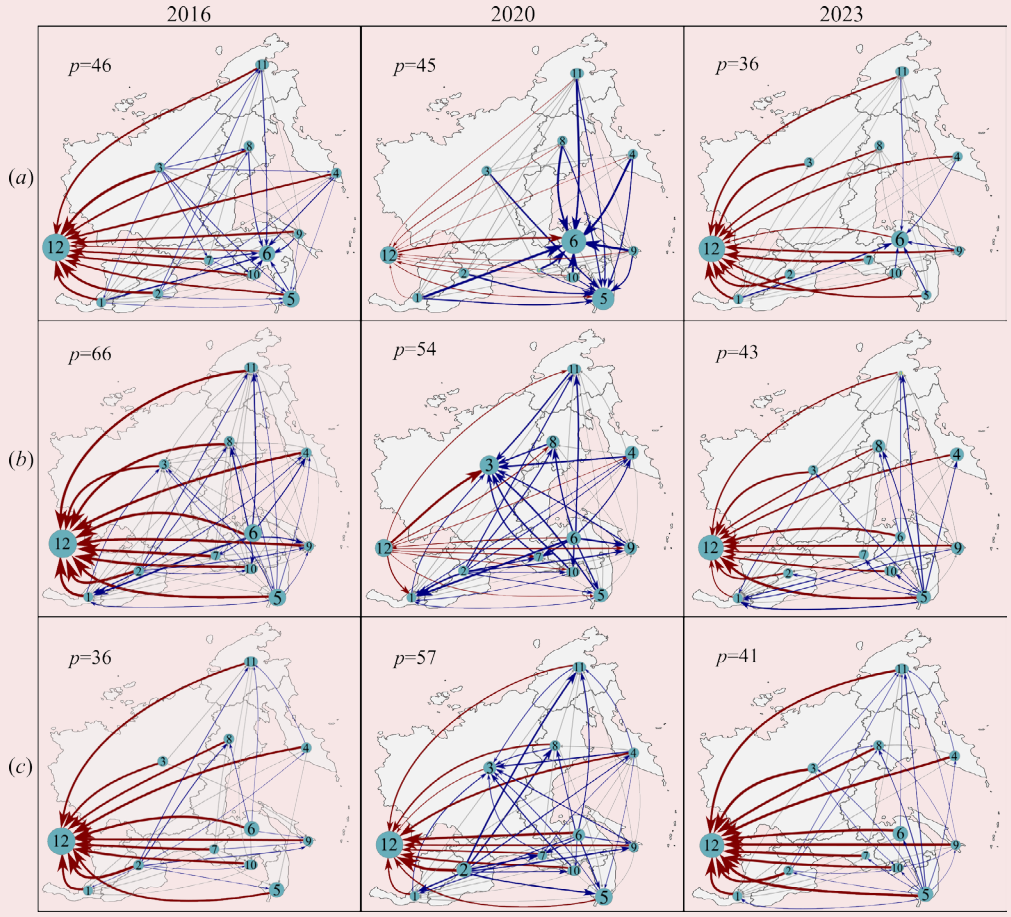
Table 1 shows the obtained minimum migration indicators (coefficients of the matrix P), which are best consistent with the real net migration and population. These values indicate how much the population in each territory has increased or decreased as a result of migratory movement. In addition to estimating the minimum number of migrants, Table 1 shows the calculation of the total number of each region's in-migrants, its proportion to all out-migrants, as well as the number of people moving within the Far East, and its proportion to all migrants.

Table 1. The lower estimate of the number of in-migrants aged 17–19 to the territory number i (row) from the territory number j (column).

2016														
Territory No	1	2	3	4	5	6	7	8	9	10	11	12	In-migrants from all territories (people and their proportion (%) to out-migrants)	
1	**1233**	34	62	0	0	0	0	0	0	0	0	0	96	7.8
2	0	**1213**	0	0	0	0	0	0	0	0	0	0	0	-
3	0	0	**1564**	0	0	0	0	0	0	0	0	0	0	-
4	50	84	112	**744**	0	0	0	0	0	0	0	0	246	33.1
5	98	132	160	48	**599**	0	34	0	49	0	0	0	521	87.0
6	287	0	0	237	189	**221**	223	202	239	223	198	0	1798	813.6
7	0	0	126	0	0	0	**725**	0	0	0	0	0	126	17.4
8	86	119	147	0	0	0	0	**625**	37	0	0	0	389	62.2
9	49	82	110	0	0	0	0	0	**825**	0	0	0	241	29.2
10	65	98	126	0	0	0	0	0	0	**667**	0	0	289	43.3
11	89	122	151	0	0	0	24	0	40	0	**618**	0	426	68.9
12	509	542	570	459	410	221	444	423	460	444	420	**0**	4902	0.00
Migration within the Far Eastern Federal District (people and %)	724	671	994	285	189	0	281	202	365	223	198	0		
	58.7	55.3	63.6	38.3	31.6	0.00	38.8	32.3	44.2	33.4	32.0	0.00		
2020														
Territory No	1	2	3	4	5	6	7	8	9	10	11	12	In-migrants from all territories (people and their proportion (%) to out-migrants)	
1	**355**	23	16	0	0	0	0	0	7	0	0	0	46	13.0
2	0	**371**	0	0	0	0	0	0	0	0	0	0	0	-
3	0	0	**380**	0	0	0	0	0	0	0	0	0	0	-
4	0	30	24	**312**	0	0	0	0	0	0	0	0	54	17.3
5	107	130	124	100	**76**	0	71	92	114	90	85	64	977	1285.5
6	183	0	0	176	76	**0**	147	168	189	166	161	140	1406	-
7	0	0	53	0	0	0	**225**	0	43	0	0	0	96	42.7
8	0	38	31	0	0	0	0	**288**	22	0	0	0	91	31.6
9	0	0	0	0	0	0	0	0	**477**	0	0	0	0	-
10	0	40	34	0	0	0	0	0	24	**282**	0	0	98	34.6
11	22	44	38	0	0	0	0	0	28	0	**267**	0	132	49.4
12	43	66	60	36	0	0	7	28	50	26	21	**204**	337	165.2
Migration within the Far Eastern Federal District (people and %)	312	305	320	276	76	0	218	260	427	256	246	0		
	87.9	82.2	84.2	88.5	100.0	-	96.9	90.3	89.5	90.8	92.1	-		
2023														
Territory No	1	2	3	4	5	6	7	8	9	10	11	12	In-migrants from all territories (people and their proportion (%) to out-migrants)	
1	808	0	0	0	0	0	0	0	0	0	0	0	0	-
2	0	565	0	0	0	0	0	0	0	0	0	0	0	-
3	13	0	**337**	0	0	0	0	0	0	0	0	0	13	3.9
4	62	54	0	**337**	0	0	0	0	0	0	0	0	116	34.4
5	0	0	0	0	**460**	0	0	0	0	0	0	0	0	-
6	164	0	0	102	122	**133**	0	83	116	106	96	0	789	593.2
7	18	0	0	0	0	0	**279**	0	0	0	0	0	18	6.5
8	81	73	0	0	40	0	0	**299**	34	0	0	0	228	76.3
9	47	39	0	0	0	0	0	0	**420**	0	0	0	86	20.5
10	58	50	0	0	16	0	0	0	0	**345**	0	0	124	35.9
11	68	60	54	0	26	0	0	0	20	0	**325**	0	228	70.2
12	297	289	283	235	256	133	279	216	250	239	229	**0**	2706	-
Migration within the Far Eastern Federal District (people and %)	511	276	54	102	204	0	0	83	170	106	96	0		
	63.2	48.9	16.0	30.3	44.4	-	-	27.8	40.5	30.7	29.5	-		

The diagonal contains the total number of out-migrants of the *i* territory. A non-zero inward flow from territories outside the Far East is highlighted in gray.
Source: own compilation.

Figure 5. Migration flows between the regions of the Far Eastern Federal District and the rest of the Russian Federation for age groups (a) 17–19, (b) 20–29, and (c) 30–44 years



The blue lines represent the largest internal migration flows, the gray lines represent small flows (less than 100 people per year), and the red lines represent the Far Eastern Federal District's external migration. The p value is the number of edges of the migration flow graph.

Source: own calculation.

Let us consider the values of migration indicators for the three most active age groups – 17–19, 20–29 and 30–44 years.

Estimating the values of minimum migration indicators makes it possible to visualize bilateral flows of migrants between regions using the values P_{ij} or w_{ij} as the weights of the oriented graph's edges *(Fig. 5)*. Note that even after "setting to zero" some values of the paired net migration, the Far Eastern territories turn out to be strongly interconnected. Most of them are linked with each other even though this connection is weak. Graphs constructed for selected age groups do not have cycles, but contain explicit points of attraction (sinks) and repulsion (sources) of population flows. Migration outside the Far East (and inside in 2020–2021), as well as migration to the most developed regions (Khabarovsk, Primorye territories, Republic of Sakha (Yakutia)) are among the largest flows.

According to Figure 5, the intensity (line thickness) and directions (arrows) of population flows between regions differ significantly for different age groups and change considerably over time. In addition, the connectivity of territories changes noticeably, which represents the number p of the graph's edges. Let us consider the quantitative

characteristics of these population flows and their change over time.

As already noted, the migration estimates obtained (coefficients of the P matrix) show a lower estimate of the number of migrants. This means that the number in Tables 1–3 at the intersection of the i row and the j column ($i \neq j$) is actually slightly higher. It is impossible to say exactly how much higher. The number at the intersection of the j row and the i column has to be higher just by this value, so that the difference between these parameters is equal to the paired net migration of two territories.

The migration estimates shown in Tables 1–3 make it possible to see how each territory's migration outflow is divided, as well as visualize it in the form of a diagram (Fig. 5). For example, it is easy to see that the flow of people aged 17–19 from the Primorye Territory (column 5) is divided into two parts – most of migrants leave the Russian Federation, the smaller part's destination is the Khabarovsk Territory. At the same time, the inward flows of the Khabarovsk Territory (row 6) originate from all territories of the Far East with the exception of the Trans-Baikal Territory and the Republic of Sakha (Yakutia). Moreover, this inflow in 2016 was more than 80 times larger than the outflow. In 2020, a small inflow from abroad was added to the inflow to both the Khabarovsk and Primorye territories.

Unexpectedly, the Amur Region, where an inflow of young people from different territories was directed during the preliminary analysis of the paired net migration values, "lost" most of it. Only a small inflow was recorded from the Republic of Sakha (2016–2020), the Republic of Buryatia (2017–2019, 2021–2023), the Trans-Baikal Territory (2018) and the Magadan Region (2020–2021). In this case, the range of possible net migrations exceeded the acceptable level, and the corresponding migration flow was "set to zero" as unreliable. Most likely, there is actually an equal exchange of young people with neighboring regions. Interestingly, in the pandemic years (2020–2021), with a general decrease in the migration of young people aged 17–19, there was a slightly increased inflow to the Amur Region from other territories that had not previously been associated with it. COVID-19 restrictions probably led to a certain redistribution of the flow of young people between the most attractive, but remote territories (outside the Far East), and closer ones. However, after 2022, migration rates to the Amur Region returned to the pre-pandemic level, both in terms of the total number of migrants and typical migration patterns (structure).

Interestingly, according to the proportion of out-migrants among youth aged 17–19 who left the Far East, the regions can be divided into "east-oriented" (Republic of Buryatia, Republic of Sakha (Yakutia) and Trans-Baikal Territory) and "west-oriented". From the first group of regions, young people mostly move within the Russian Far East (the proportion of those who migrated but remained in the Far East is more than 50%). The youth of the second group tends to leave the Far East (the proportion of those who left it but remained in the Russian Federation is more than 60%). It is expected that during the pandemic years, all the Far Eastern regions became a place of destination for young people (the proportion of those who migrated but remained in the Far East is more than 80%). Only the Khabarovsk and Primorye territories' outflow more than compensated the inflow. But in the last two years of observation (2022–2023), a decrease in the inflow of young people has been recorded, while maintaining its consistently large flow outside the Far East.

It should be noted that according to official data and our calculations of net migration, young people changed their migration pattern in 2020 (as of January 1), i.e. actually before the introduction of COVID-19 restrictions. Perhaps this is due to some peculiarities of the Census that took place in the fall of 2021, which was so strangely reflected in the data of this age group. In other ages, a significant change in migration patterns was noted in 2021.

Table 2. Lower estimate of the number of in-migrants aged 20–29

2016														
Territory No	1	2	3	4	5	6	7	8	9	10	11	12	In-migrants from all territories (people and their proportion (%) to out-migrants)	
1	**1598**	295	0	0	199	468	47	0	0	7	0	0	1016	63.6
2	0	**2470**	0	0	0	61	0	0	0	0	0	0	61	2.5
3	188	51	**600**	79	204	115	134	75	77	118	76	0	1117	186.2
4	61	213	0	**764**	155	316	62	0	2	37	0	0	846	110.7
5	0	55	0	0	**2085**	121	0	0	0	0	0	0	176	8.4
6	0	0	0	0	0	**3575**	0	0	0	0	0	0	0	-
7	0	124	0	0	88	227	**1209**	0	0	0	0	0	439	36.3
8	65	219	0	2	163	327	67	**739**	3	21	0	0	867	117.3
9	61	211	0	0	150	320	63	0	**771**	42	0	0	847	109.9
10	0	176	0	0	116	285	23	0	0	**994**	0	0	600	60.4
11	70	225	0	8	165	321	70	4	8	45	**748**	0	916	122.5
12	1153	901	600	675	845	1014	743	660	681	724	672	**0**	8668	-
Migration within the Far Eastern Federal District (people and %)	445	1569	0	89	1240	2561	466	79	90	270	76	0		
	27.9	63.5	0.00	11.7	59.5	71.6	38.5	10.7	11.7	27.2	10.2	0.00		
2020														
Territory No	1	2	3	4	5	6	7	8	9	10	11	12	In-migrants from all territories (people and their proportion (%) to out-migrants)	
1	**132**	238	0	108	105	292	61	72	48	94	77	204	1299	984.1
2	0	**1342**	0	0	0	0	0	0	0	0	0	0	0	0.0
3	132	0	**0**	240	237	0	193	205	181	226	209	337	1960	0.0
4	0	131	0	**520**	0	185	0	0	0	0	0	97	413	79.4
5	0	134	0	0	**502**	188	0	0	0	0	0	100	422	84.1
6	0	0	0	0	0	**1862**	0	0	0	0	0	0	0	0.0
7	0	177	0	47	44	231	**254**	0	0	33	0	143	675	265.7
8	0	166	0	35	32	220	0	**301**	0	0	0	132	585	194.4
9	0	190	0	59	56	244	0	24	**229**	45	29	156	803	350.7
10	0	145	0	0	0	199	0	0	0	**415**	0	111	455	109.6
11	0	161	0	31	28	215	0	0	0	17	**315**	127	579	183.8
12	0	0	0	0	0	88	0	0	0	0	0	**1407**	88	6.3
Migration within the Far Eastern Federal District (people and %)	132	1342	0	520	502	1774	254	301	229	415	315	0		
	100.0	100.0	0.0	100.0	100.0	95.3	100.0	100.0	100.0	100.0	100.0	0.0		
2023														
Territory No	1	2	3	4	5	6	7	8	9	10	11	12	In-migrants from all territories (people and their proportion (%) to out-migrants)	
1	**142**	68	81	52	160	111	59	33	95	56	31	0	746	525.4
2	0	**314**	0	0	91	0	0	0	27	0	0	0	118	37.6
3	0	0	**401**	0	79	0	0	0	0	0	0	0	79	19.7
4	0	0	0	**246**	107	58	0	0	0	0	0	0	165	67.1
5	0	0	0	0	**1313**	0	0	0	0	0	0	0	0	-
6	0	0	0	0	49	**634**	0	0	0	0	0	0	49	7.7
7	0	0	0	0	101	0	**313**	0	0	0	0	0	101	32.3
8	0	36	48	0	127	78	26	**208**	62	0	0	0	377	181.3
9	0	0	0	0	65	0	0	0	**523**	0	0	0	65	12.4
10	0	0	0	0	104	55	0	0	39	**254**	0	0	198	78.0
11	0	0	49	0	128	79	27	0	63	0	**204**	0	346	169.6
12	142	210	223	194	302	253	201	175	237	198	173	**0**	2308	-
Migration within the Far Eastern Federal District (people and %)	0	104	178	52	1011	381	112	33	286	56	31	0		
	-	33.1	44.4	21.1	77.0	60.1	35.8	15.9	54.7	22.1	15.2	0.0		

Source: own compilation.

The analysis of the lower estimates of migration of the following age group (20–29 years) is generally consistent with the results of a preliminary analysis of the paired net migration values *(Tab. 2)*. It is possible to identify the regions with the largest outflow (more than 1000 people per year) – the Trans-Baikal, Khabarovsk and Primorye territories, and the regions with the largest population inflow – the Republic of Sakha (Yakutia), the Kamchatka Territory, the Magadan Region for all the years of observation. For the first group of regions, the destination territories are mainly other regions of the Far East (more than 60%), which remains fairly stable in the structure (patterns), with the exception of 2022, when the outflow was replaced by an inflow. It should be noted that the population leaves small regions moving mainly outside the Far East (more than 70% of all out-migrants).

The migration attractiveness of the Republic of Sakha, the Kamchatka Territory, the Magadan and Sakhalin regions has changed significantly. For example, in 2016–2017, the maximum in-migration among the 20–29 age group was recorded in the Republic of Sakha (Yakutia) and the Magadan Region. After 2018, there was an increased interest in migrating to the Sakhalin Region (1.5 times more than to other regions). During the pandemic years, most of the cohort's representatives came to the Republic of Sakha (Yakutia), mainly from the regions of the Far East. In addition, in some years there were surges of inflows to the Republic of Buryatia in 2016, 2020 and 2023, the Kamchatka Territory and the Sakhalin Region in 2018–2019.

During the pandemic years and immediately after them (2021–2022), this age group contributed to perhaps the most massive inflow from all territories, including regions outside the Far East, as well as provided the largest proportion of internal migration (up to 100%). It probably includes both the forced return of a part of the population from other regions, and the subsequent massive inflow of international migrant workers in 2022, who could not enter the Russian Federation in 2020–2021 due to COVID-19 restrictions.

According to calculations, by 2023, migration rates for the population aged 20–29 have not recovered to their previous levels. This is reflected both in quantitative indicators and in the diversity of migration patterns. In our opinion, it is rather premature to say that there have been qualitative changes in migration for this age group, since data for 2023 on the number, mortality and migration of this most active migration group may be preliminary and adjusted by the beginning of 2025.

For the next cohort (30–44 years), according to the results of the migration indicators analysis, a new departure leader can be noted – the Trans-Baikal Territory *(Tab. 3)*. Its population outflow remained at approximately the same high level as for the previous age group, though still within the Far East (more than 60%). At the same time, for the Primorye and Khabarovsk territories, the outward flow rate equaled the average for the Far East, but the main outflow is oriented beyond the Far East. However, in some years (2019–2021), there were surges of departures from the Khabarovsk Territory, but due to an increase in the proportion of internal Far Eastern migration. In the pandemic years, especially in 2021, the Khabarovsk and Primorye territories again surpassed other regions both in terms of the number of out-migrants aged 30–44 and the migration structure. In 2021–2022, the Amur Region was added to the leaders in population outflow for this age group.

There was also a change in the leading regions receiving migrants aged 30–44 – the Magadan, Sakhalin regions and the Chukotka Autonomous Area alternately received a maximum of migrants (up to 1,500 per year). However, in the pandemic years, due to the return of the population from all regions of the Russian Federation, the Republic of Sakha (Yakutia) became the obvious leader in terms of in-migration (more than 3,000 people per year).

We can confidently say that unlike the previous age group (20–29 years) the migration structure of the cohort of 30 to 44 years has changed significantly after 2022, because, despite the recovery of the total number of migrants by 2023, "atypical" migration

Table 3. Lower estimate of the number of in-migrants aged 30–44

2016														
Territory No	1	2	3	4	5	6	7	8	9	10	11	12	In-migrants from all territories (people and their proportion (%) to out-migrants)	
1	**727**	139	0	23	0	51	18	0	0	5	0	0	236	32.5
2	0	**2066**	0	0	0	0	0	0	0	0	0	0	0	-
3	0	0	**714**	0	0	0	0	0	0	0	0	0	0	-
4	0	116	0	**927**	0	0	0	0	0	0	0	0	116	12.5
5	0	183	0	67	**683**	0	62	0	0	0	0	0	312	45.7
6	0	0	0	0	0	**1239**	0	0	0	0	0	0	0	-
7	0	0	0	0	0	0	**1103**	0	0	0	0	0	0	-
8	0	206	0	0	0	118	85	**660**	0	0	0	0	409	62.0
9	0	219	28	0	0	131	98	0	**647**	0	0	0	476	73.6
10	0	134	0	0	0	46	13	0	0	**806**	0	0	193	24.0
11	0	203	11	87	0	115	82	0	0	69	**663**	0	567	85.5
12	727	866	675	750	683	778	745	660	647	732	663	**0**	7926	-
Migration within the Far Eastern Federal District (people and %)	0	1200	39	177	0	461	358	0	0	74	0	0		
	-	58.1	5.5	19.1	-	37.2	32.5	-	-	9.2	-	-		
2020														
Territory No	1	2	3	4	5	6	7	8	9	10	11	12	In-migrants from all territories (people and their proportion (%) to out-migrants)	
1	**466**	214	0	61	0	135	0	0	16	40	0	0	466	100.0
2	0	**2232**	0	0	0	0	0	0	0	0	0	0	0	0.00
3	134	0	**113**	195	110	0	103	124	150	173	103	0	1092	966.4
4	0	153	0	**969**	0	74	0	0	0	0	0	0	227	23.4
5	24	238	0	85	**333**	159	0	14	40	64	0	0	624	187.4
6	0	79	0	0	0	**1440**	0	0	0	0	0	0	79	5.5
7	31	245	0	92	0	166	**319**	21	47	71	0	0	673	211.0
8	0	224	0	71	0	145	0	**416**	0	0	0	0	440	105.8
9	0	198	0	45	0	119	0	0	**563**	0	0	0	362	64.3
10	0	175	0	21	0	95	0	0	0	**705**	0	0	291	41.9
11	30	245	0	91	0	165	0	20	47	70	**320**	0	668	208.8
12	247	461	113	308	223	382	216	237	263	287	217	**0**	2954	-
Migration within the Far Eastern Federal District (people and %)	219	1771	0	661	110	1058	103	179	300	418	103	0		
	47.0	79.4	-	68.2	33.0	73.5	32.3	43.0	53.3	59.3	32.2	-		
2023														
Territory No	1	2	3	4	5	6	7	8	9	10	11	12	In-migrants from all territories (people and their proportion (%) to out-migrants)	
1	**1158**	73	50	33	278	14	0	0	64	0	0	0	512	44.2
2	0	**1704**	0	0	206	0	0	0	0	0	0	0	206	12.1
3	0	0	**1589**	0	228	0	0	0	0	0	0	0	228	14.4
4	0	0	0	**1415**	245	0	0	0	0	0	0	0	245	17.3
5	0	0	0	0	**4176**	0	0	0	0	0	0	0	0	-
6	0	0	0	0	264	**1344**	0	0	0	0	0	0	264	19.6
7	7	0	0	0	286	0	**1214**	0	0	0	0	0	293	24.1
8	0	127	104	87	333	0	0	**1097**	118	0	0	0	769	70.1
9	0	0	0	0	214	0	0	0	**1659**	0	0	0	214	12.9
10	0	130	107	0	336	72	0	0	121	**1094**	0	0	766	70.0
11	0	150	127	111	356	92	70	0	141	0	**1074**	0	1047	97.5
12	1151	1224	1201	1184	1430	1166	1144	1097	1215	1094	1074	**0**	12980	-
Migration within the Far Eastern Federal District (people and %)	7	480	388	231	2746	178	70	0	444	0	0	0		
	0.6	28.2	24.4	16.3	65.7	13.2	5.8	-	26.8	-	-	-		

Source: own calculation.

trends have formed. They appeared in 2021–2022 and were partially preserved in 2023. For example, the departures rate from the Primorye Territory has increased significantly (more than 2,500 people per year) with a high proportion of internal migration (more than 65%). But, more importantly, the flow from all regions of the cohort aged 30–44 outside the Far East has significantly increased (more than 1000 people per year, more than 70% of the total out-migration). It should be noted that a small number of internal migrants of this age group, who replenish the population of the Trans-Baikal Territory, the Magadan Region, the Sakhalin Region, the Chukotka Autonomous Area and the Jewish Autonomous Region, are not able to fully compensate for the population outflow, since, most likely, migrant workers arrive, who make up the majority of the next age group's out-migrants in the following years.

Conclusion

In the present study, a methodology for assessing migration activity between pairs of regions was developed and tested. The methodology is based on the construction and solution of fairly simple population balance equations between all related regions and uses a quite small amount of data on population, fertility and mortality. Solving these equations, taking into account reasonable restrictions imposed on migration parameters, allows us to specify narrow ranges of the number of migrants between each pair of regions, ensuring a sufficiently accurate match with the observed natural and migratory movement of the population in each region. Using fairly simple static criteria (Pearson's chi-squared test and Student's t-test), it is easy to discard some of the found migration parameters that accidentally differ from zero, i.e. to identify regions that are not interconnected, and, on the contrary, to prove that some other regions are actually connected.

The author's methodology was applied to assess migration between 11 regions of the Far East and the rest of the Russian Federation. At the stage of processing the initial data for a number of regions, some anomalies and manipulations with official data on the population, birth and mortality rates of children and adolescents under 15 years were found, which does not allow us to unambiguously describe their migration. Therefore, the migration of older and at the same time the most mobile age groups is considered in detail, without noticeable peculiarities in the initial data – 17–19, 20–29 and 30–44 years. The migration indicators found for them are lower estimates that ensure the preservation of population balance. It should be noted that our estimates do not pretend to be absolutely accurate. They are only the "average" of the minimum values of migration indicators with a certain range of possible values that guarantee the preservation of population balance. Therefore, the actual migration is likely to be slightly higher. The lower estimates showing the migration increase by interchanging population with each region are quite sufficient to identify the destination territories where a large number of migrants move and indicate regions of origin this inflow comes from.

It should be noted that numerous works devoted to migration both in the Far East and other regions of Russia do not provide such a detailed description of bilateral flows (Neverova, 2010; Neverova, Revutskaya, 2017; Vakulenko et al., 2011; Korovkin, Sinitsa, 2019). The studies can be mentioned that have built detailed networks of flows between countries (Abel, 2014; Gou et al., 2020). However, they only consider changes in the total number of migrants without taking into account the age structure. As a result, it is not clear whether the changes in the patterns of international migration over the past 50 years, revealed in these works, were accompanied by a corresponding reform in the age structure of the migrating population. An analysis of migration processes in the Far East showed that even within a short time period (2016–2023), this happened several times.

An analysis of migration estimates performed for different age groups and their changes over time revealed a number of features of population movement. Let us list the main results.

1) The majority of migrants (more than 60%) from all 11 Far Eastern regions of the considered age groups leave the Far East. In the pandemic years (2020–2021), there was a change in the migration pattern – a small inward flow from territories outside the Far East for age groups 17–19 and 20–29 years.

2) The leaders in receiving internal migrants are the Khabarovsk, Primorye territories and the Republic of Sakha (Yakutia), the attractiveness of which varies among different age groups and over time. The majority of those who arrived in the Khabarovsk and Primorye territories are young people aged 17–19, who, most likely, enroll in secondary and higher educational institutions. These regions are of consistently high interest among young people and this trend peaked during the pandemic years (in proportion to migration outside the Far East). Although recently there has been a slight decrease in migration to the Primorye Territory.

3) The outflow of the population aged 20–29 is mostly directed to the origin regions of people aged 17–19 (which they left 3–5 years before that). However, in general, this flow is 1.5–2 times less than the initial inflow. Interest in coming to the Republic of Sakha (Yakutia) and partly to the Republic of Buryatia among this age group has especially increased during the pandemic years.

4) The internal migration of the cohort aged 30–44 is as diverse as possible, directed to almost all regions of the Far East and has significantly increased during the years of coronavirus restrictions. The Khabarovsk and Primorye territories became the leaders in terms of this age group's migration outside the Far East.

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Experience in Supporting Large Families: An Overview of Successful Practices

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Abstract. A new protracted wave of depopulation in Russia, caused by birth rate decline and high mortality, poses serious risks to the labor potential, economic and social development of the country. In recent years, the government has been taking active measures to raise birth rate. Taking into account the fact that the growth potential of birth rate lies in an increase in the proportion of large families, it is necessary to update effective mechanisms for regulating the number of children in families. In this regard, it is interesting to study the tools for supporting families with children implemented by foreign governments in the context of the recorded population fertility dynamics. The aim of this study is to review government measures to stimulate fertility and support large families in countries around the world. The information was derived from electronic databases of Russian and international statistics, websites of foreign governments, and scientific literature on the research topic. In the course of the work we used general scientific and empirical research methods. The analysis showed that in most countries there are no measures to support large families as a special category, and demographic policy is limited to providing women with short-term paid maternity leave and monthly childcare benefits. Most of the aid goes to poor families. Some countries provide tax and pension benefits for large families, and childcare allowances that increase with the birth of a subsequent child. The demographic and family policy being implemented in Russia is focused to a greater extent on families with children, including those with many children, which has the status of state priority. The following formats of support for families with children are of practical interest from the point of view of potential application in Russia: Polish programs "500+", "Big family card", "Mother 4+"; programs implemented in some oil and gas exporting countries: "Marriage bonus (loan)", allocation of housing to a young family, opening an account for a newborn and its regular replenishment, tuition fees; "maternity leave" for men and the opportunity to use parental leave for eight years in the Nordic countries; partial or full compensation for babysitting services, including for close relatives caring for a child; payment for preschool educational institutions, vacation clubs, etc. in a number of European countries. Practical significance of the work lies in the possibility of taking into account international experience in the development of federal and regional programs to support potential and actual families with many children.

Key words: depopulation, demographic policy, family policy, large family, government support measures, fertility.

For Russia, a large family is a historical tradition that needs to be restored: it must be established as a norm, as a value guideline for society and as the most important priority for the state.

Vladimir Putin

Introduction

The country's demographic development has a significant impact on the economy and social processes. Depopulation and demographic aging have a negative effect on socio-economic development and change the demographic profile, which also affects the social structure. Therefore, in the 20th century, the concept and aim of Russia's "demographic policy" are finally formed as a purposeful activity of state authorities and other social institutions in the sphere of regulating the reproduction processes[1] to ensure its expanded or at least simple mode[2].

[1] Iontsev V.A. (Ed.). (2013). *Course of Lectures on Demography*. Moscow: MSU Faculty of Economics: Ankyl.

[2] Kuchmaeva O.V. (2022). Demographic policy, its role in the development of society. In: Karmanov M.V. (Ed.). *Demography: Textbook and Practitioners*. Moscow: Yurait.

Russia's demographic problems are standard. Most countries in the Western world have also been searching for ways to improve the demographic situation against the background of depopulation and population aging for decades (Guzzo et al., 2019). Doctor of Sciences (Philosophy), a prominent specialist in the field of institutional sociology of the family and sociological demography, professor emeritus of Moscow State University, A.I. Antonov says that it is necessary that in the family structure about half of families should have 3–4 children, and every tenth – with five or more to get out of depopulation. According to the latest All-Russian Population Census (ARPC) of 2020, 55% of families with children are raising one child, 33% are raising two children, and 12% (about 1.7 million families) are raising three or more children. Most of the latter (1.3 million) are full families, 344 thousand with only a mother, and 60 thousand with only a father. Three quarters of large families have three children, and 13.5% have four children. Deputy Prime Minister of the Russian Federation Tatyana Golikova said that 24.5 million families with children live in the country (30 million children are brought up in them) during the presentation of the Year of the Family at the International Exhibition and Forum "Russia" at the VDNKh in Moscow in January 2024. The number of large families in Russia has reached 2.3 million, increasing by 27% over the previous five years[3]. Thus, large families account for only 9.3% of families with children, so the issue of stimulating the growth of the share of large families and their support remains open and highly relevant.

The "family crisis" has become a significant prerequisite for the reduced reproduction. Its vivid manifestations include high divorce rates, voluntary childfree, the spread of cohabitation, the legitimization of same-gender marriage in some Western countries (Regnerus, 2012), and the problems of having and raising children in such families (Andryushina, Lutsenko, 2020). The response to the challenges of the family's socio-cultural crisis in Russia became measures to consolidate traditional values, including the constitutional enshrinement of the concept of marriage as the union of a man and a woman (Article 72 of the Constitution of the Russian Federation, edition of July 1, 2020) and the formation of the RF state policy to preserve and strengthen traditional Russian spiritual and moral values (approved by Presidential Decree 809, dated November 9, 2022).

Despite the existence of universal values declared in the UN fundamental documents, each state offers its own methods of supporting families with children, identifies the object of support, and implements specific mechanisms (Andryushina, Lutsenko, 2020). A specific set of measures of family policy and fertility promotion policy predetermines the type of family desired by the state (who exactly takes care of the child in the postpartum period, how many children in the family) (Zhuravleva 2016). It is clear that there is a group of countries where demographic policy is unformed due to objective circumstances or political position.

Nevertheless, the pool of countries that regulate population reproduction is representative, and their experience is interesting from both scientific and practical points of view.

Research on demographic policy in the area of fertility stimulation, support for families with children and its effectiveness

The effectiveness of measures to stimulate fertility and state policies to support families with children varies from country to country depending on different factors: from historical and socio-cultural aspects of family policy and the characterization of family values in different societies to the level of socio-economic development and well-being of particular countries (Andryushina, Lutsenko, 2020).

[3] Mamikonyan O. The number of large families in Russia has grown by 27% in five years. Available at: https://www.forbes.ru/forbeslife/504724-cislo-mnogodetnyh-semej-v-rossii-vyroslo-na-27-za-pat-let

Based on a meta-analysis of scientific studies, P. MacDonald proposed his own classification of the effectiveness of fertility stimulation measures (MacDonald, 2006). He distinguished the following:

- the Federal Republic of Germany's (1976) set of pronatalist measures led to a 15–20% increase in fertility over a ten-year period (1977–1987) (Buttner, Lutz, 1990);
- arranging childcare (more than flexible working hours) contributes to fertility (Castles, 2003);
- it is easier for women to decide to have a child at a younger age in cities with developed childcare assistance systems (Kravdal, 1994);
- fertility increases by 20% if it is possible to place older children in preschools (Kravdal, 2001);
- addressing work-life balance, family life, and childcare increases the likelihood of having a second and third child for women with high education levels (Baizan, 2002; Rønsen, 2004; Hoem, 2000; Olah, 2001; Rindfuss, 1996); these findings are later confirmed by studies of pronatalist policies in Japan, South Korea, and Singapore (Sun, 2012);
- as the income level raises, the share of those who want to have a child, increases (Lovenheim, Mumford, 2013);
- a 10% increase in the state child allowance leads to a 25% increase in fertility (Adkins, 2003), and a one-quarter increase contributes 4% to the total fertility rate (Gauthier, 1997).

Similar data were obtained by other demographers in Israel (Cohen et al., 2013), Canada (Blac et al., 2013), and Spain. For example, the introduction of a child allowance of 2.5 thousand euro in Spain in 2007, contributed to a 6% increase in fertility (González, 2013), and an increase in Canada of 1,000 Canadian dollars in the first year of a child's life increased the probability of having a child by 17% (Milligan, 2005).

Thus, there is a link between fertility rates and support for families with children. However, to maintain and strengthen the effect of the policy, it is necessary to regularly check the "application points" of the impact in relation to the problems of families with children that need to be addressed.

The authors of a large number of works emphasize the changes in the living standards of families, the increase in the risk of poverty with the appearance of another child (Arkhangelskiy et al., 2019; Bobkov, 2019; Elizarov, Sinitsa, 2019; Surinov, Kuzin, 2023). Family capital becomes a resource for solving housing problems, providing education for children (Grishina, Tsatsura, 2017; Elizarov, Dzhanaeva, 2020). This measure can be considered one of the significant measures of demographic policy proper, as its receipt is determined only by a demographic event – the birth of a child, family income does not affect its receipt.

Legal aspects of social support of large families in Russia and abroad are considered in the works of K.S. Smirnova (Smirnova, 2009). N.A. Voskolovich and I.Ch. Askhabaliev emphasize the division of support measures for large families in Russia within the framework of approved legislative and legal provisions into real (provided to the family purely by the fact of its status as a large family regardless of other conditions) and potential (for example, in case of a decline in the standard of living as a low-income family). The authors promote the idea of forming a system of real measures to support large families (Voskolovich, Askhabaliev, 2021).

The search for features and factors concerning reproductive behavior of young people and opportunities for its regulation in Russia is carried out by the staff of the Institute of Demographic Studies of the Federal Research Center of the Russian Academy of Sciences (Rostovskaya, Vasilieva, 2021). The works of scientists from Vologda Research Center of RAS (Kalachikova, Gordievskaya, 2014; Leonidova, Kalachikova, 2016; Korolenko, 2019; Ilyin et al., 2021) are devoted to the management of reproductive behavior and the evaluation of measures of state support for large families on

the example of the Vologda Region. The work conducted by the research team (Rostovskaya, 2022), devoted to the assessment of the demographic behavior in the context of Russia's national security, leads to the conclusion that the potential of having many children as the main resource for achieving the regime of simple reproduction is available and in the current situation families are increasingly implementing it under favorable conditions.

A number of works are devoted to assessing the relationship between religiosity and fertility in Russia (Kalachikova et al., 2022), including against the background of other European countries (Prutskova et al., 2023). It is likely that this factor is indirect, affecting the marriage and reproductive behavior, and the severity of the influence depends on the degree of religiosity, the strength of faith, and the observance of its canons.

Researchers from the Novosibirsk State University of Economics and Management analyzed modern family policy measures in Russia in comparison with foreign ones. The authors conclude that the variety of measures to support families with children does not ensure the achievement of the desired fertility rates, does not provide a high standard of living for families, and does not solve the problem of effective combination of parental and professional responsibilities. All this requires the development and use of differentiated regional approaches to support motherhood and childhood in Russia (Volkova, Kudayeva, 2019).

In addition, in the context of the current demographic situation, it is of particular importance to support large families as a socio-demographic phenomenon and to ensure the well-being of large families. It is worth noting that in Russia, as well as in Western European countries and the United States, families with three or more children are considered to have many children. In some European and Latin American countries, the concept of "large families" is absent in principle, but social payments to families are provided in proportion to the number of children born (Voskolovich, Askhabaliev, 2021).

The aim of our study is to review the state instruments of fertility stimulation and measures to support large families in the countries of the world to identify potentially promising ones for implementation in the Russian demographic policy.

Methodology of the research

As a preliminary step, we analyzed the total fertility rate (TFR) in the world and for different countries using data from two main sources: the website of Swedish web developers "Database. Earth"[4] (data for the period 1950–2024) and the World Bank website[5] (TFR for the period 1960–2021 with the possibility to download and process the information in Excel format). These resources include data from the UN Population Division (World Population Prospects: 2022 revision); census reports and other statistical publications of national statistical offices; demographic statistics of Eurostat; and the report on population and vital statistics (various years) of the UN Statistics Division.

As an object of research, it is necessary to determine the principle of selection of countries for analysis. It is logical to consider countries with expanded reproduction of population (conditionally, their TFR is equal to or more than 2.1). However, the vast majority of them are either poor developing countries (African, Asian), or countries with strong religious traditions and/or no demographic policy or too short a period of its implementation (e.g., Kyrgyzstan, where maternity benefits were only started to be paid in 2018). We excluded such countries from the analysis. However, taking into account fertility trends in developed countries with a long history of demographic policy, countries with TFR below 2.1, which includes Russia, should be included in the analysis.

[4] https://database.earth/population/fertility-rate
[5] https://data.worldbank.org/indicator/SP.DYN.TFRT.IN

Analyzing the available statistical data, we have additionally identified a number of countries in which positive *(Tab. 1)* and negative dynamics of the TFR indicator was noted in relation to 1980, 1990, 2000, 2010. As we can see, only a few of them have a fertility rate above the population reproduction rate. And stable positive dynamics of the indicator for the whole period is observed only in Kazakhstan.

For further analysis of demographic and family policies, we selected countries representing four groups: those with a TFR level above or below 2.1 in the last year available for analysis (in this case, 2021) and those showing positive (at least in one time period) or negative TFR dynamics in the period under review *(Tab. 2)*.

The subsequent main block of analysis included three stages. The first stage analyzed the key instrument of support for families with children – maternity leave. In the late stages of pregnancy, during childbirth and the postpartum period, a woman is objectively incapable of working and needs support and medical care. This is the most sensitive period of motherhood. It is important to check whether there is a relationship between fertility parameters and the characteristics of maternity leave (duration, payment, substitute instruments/ institutions, etc.). In the second stage, we carried out a review of support measures for families with children in the four selected groups of countries according to the level and dynamics of TFR. At the third stage, we implemented a systematization

Table 1. Countries with positive dynamics of total fertility rate (per 1 woman) in 2021 in relation to 1980, 1990, 2000, 2010

Country	TFR in 2021	Growth, %			
		by 1980	by 1990	by 2000	by 2010
Kazakhstan	3.320	114.48	122.1	184.44	128.19
Israel	3.000	92.54	106.2	101.69	99.01
Kyrgyzstan	2.890	68.53	79.6	120.42	93.23
Georgia	2.081	89.43	90.2	129.98	108.44
France	1.830	98.92	103.4	96.83	90.15
Czech Republic	1.830	87.98	96.3	159.13	121.19
Romania	1.800	74.07	98.4	137.40	113.21
Denmark	1.720	110.97	103.0	97.18	91.98
Sweden	1.670	99.40	78.4	108.44	84.34
Slovenia	1.640	77.73	112.3	130.16	104.46
Estonia	1.610	79.70	78.5	118.38	93.60
Germany	1.580	109.72	109.0	114.49	113.67
Latvia	1.570	84.41	77.7	125.60	115.44
Switzerland	1.520	98.06	96.2	101.33	100.00
Russia	1.493	78.99	78.9	124.94	95.28
Belarus	1.483	73.05	77.5	112.60	99.26
Austria	1.480	89.70	101.4	108.82	102.78
Greece	1.390	62.33	100.0	111.20	93.92

Table 2. Countries – representatives of selected groups, chosen for demographic policy analysis

TFR	TFR dynamics	Countries
More than 2.1	Positive	Kazakhstan, Israel
	Negative	Kuwait, Saudi Arabia
Less than 2.1	Positive	Germany, France, Austria, Sweden, Greece, Slovenia, Belarus, Latvia, Georgia, Russia
	Negative	Japan, South Korea, USA, UK, Italy, Spain, UAE, Australia, China, Norway, Finland, Poland

of all possible instruments of support for families with children and critically analyzed their applicability to Russian conditions. We collected the information in electronic databases of Russian and international statistics, on the foreign government websites. The work used general scientific (literature analysis; study and generalization of information; comparison; synthesis; induction; deduction; classification) and empirical methods of research.

Research results

Maternity leave in different countries of the world as a key tool to support families with children. For the first time in the world, maternity leave was introduced in Soviet Russia on November 27 (14), 1917. The Council of People's Commissars adopted the Decree "On Maternity Allowance". As a result, expectant mothers and women in labor received a cash benefit equal to 100% of their wages for 56 days before and 56 days after childbirth. Employers were fined heavily for allowing women to work during maternity leave. Breastfeeding mothers were also entitled to 25–50% of their earnings for nine months after childbirth; and a break of at least half an hour every three hours. Specially equipped facilities were provided for breastfeeding the infant. A nursing mother's working day (for nine months after childbirth) did not exceed six hours a day[6].

At the beginning of 2025, paid maternity leave in Russia is 4 weeks longer and amounts to 20 weeks (70 days before and 70 days after childbirth), and in case of multiple pregnancies – 84 days before and after childbirth. The maternity allowance is 100% of the woman's wage. From the 21st week until the child reaches 1.5 years of age, a childcare allowance is paid, 40% of the wage of the parent who will provide care. As a rule, this is the mother. The maximum amount of childcare allowance for children up to 1.5 years of age is set annually. Based on its amount set, for example, for 2025 (68,995 rubles 48 kopecks[7]), the average wage of a mother or father should be slightly more than 172 thousand rubles in the last two years. In 2024, the maximum benefit amount was 49,123 rubles 12 kopecks[8], and the median wage was about 62 thousand rubles, i.e. half of the working population could count on benefits from the minimum 9 thousand to 25 thousand rubles, i.e. from 50 to 70% of the subsistence minimum (17,733 rubles). Without retaining this type of allowance, there is an opportunity to continue caring for a child up to 3 years of age, while the parent will retain his or her job.

The longest maternity leave is taken in Bulgaria (58.6 weeks), Greece (43), and the United Kingdom (39). Russia shares tenth place with Poland and Luxembourg (20 weeks; *Fig. 1*). Tunisia has the shortest maternity leave among 152 countries surveyed, with only 4.3 weeks. The second and third places belong to Lebanon and Qatar (slightly more than 5 weeks).

On average, one-third of States (47 out of 152) grant women maternity leave of about 3 months (12.0–12.9 weeks), or 3.5 months (25 States – 14 weeks), or about 4 months (12 States – 18 weeks)[9]. In the United States, a woman has the right to leave the workplace for the birth or adoption of a child for 12 weeks.

Of the 15 countries with the longest maternity leave, only half (Bulgaria, Greece, Slovakia, Croatia, Czech Republic, Hungary, Russia) had positive dynamics of the TFR indicator in some periods of recent history.

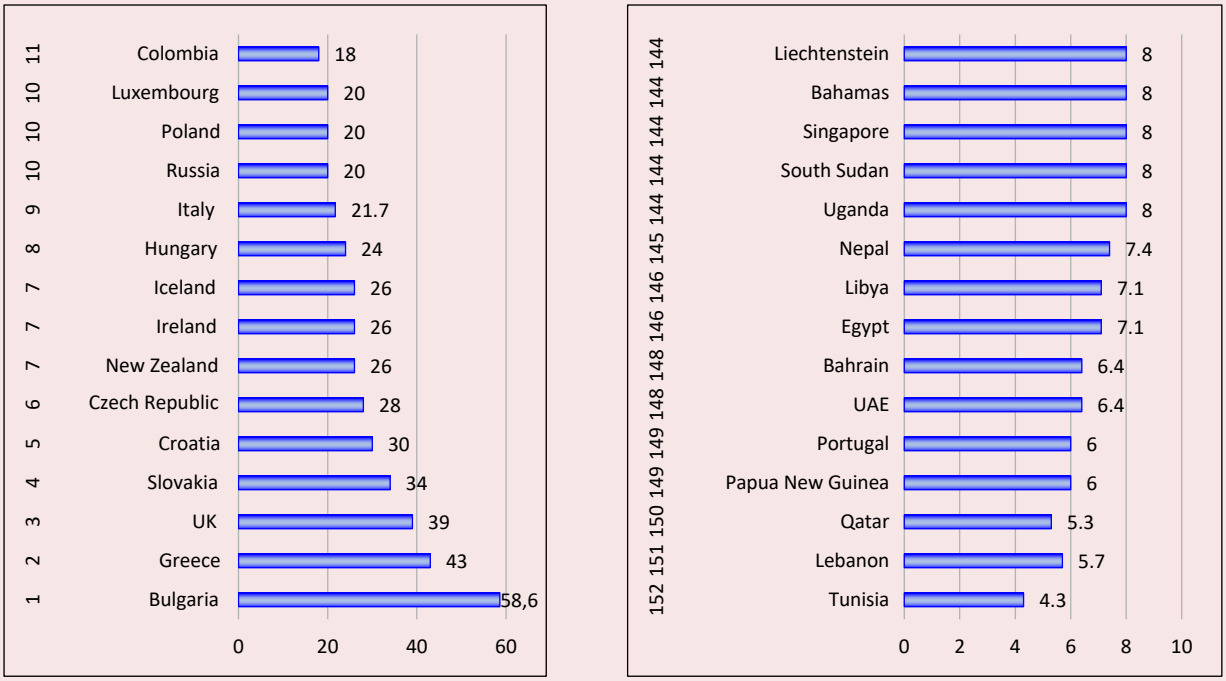
[6] Decree of the All-Russian Central Executive Committee on sickness insurance, dated December 22, 1917 (January 4, 1918). Decrees of Soviet power. Volume I. October 25, 1917 – March 16, 19189. Moscow: State Publishing House of Political Literature, 1957.

[7] https://www.consultant.ru/law/ref/poleznye-sovety/detskie-posobija/posobie-po-uhodu-za-rebenkom/

[8] https://www.garant.ru/article/1677828/

[9] According to: https://worldpopulationreview.com/country-rankings/maternity-leave-by-country

Figure 1. Top 15 countries with longest and shortest maternity leave, weeks



According to: Paid maternity, parental and home care leave available to mothers, in weeks, 2022. Parental Leave Systems. Available at: https://worldpopulationreview.com/country-rankings/maternity-leave-by-country

The longest paid total leave for childbirth and childcare is provided in Slovakia (164 weeks; *Tab. 3*), Finland (161) and Hungary (160). At the same time, we find that the total fertility rate in Slovakia has increased by a quarter in the last 20 years, in Hungary by 27% in the last 10 years, and Finland has also seen some growth in the last 5 years (from 2019 by 4%).

Estonia and Slovenia are the only countries on this list where all (82 and 52, respectively) weeks of total leave (maternity and childcare) are paid in full (100% of wages) to maternity women. It is worth noting that in both countries we observe positive changes in the TFR indicator: it increased by 30% in Slovenia and by 18% in Estonia compared to 2000.

The United States, along with countries such as the United Kingdom, New Zealand, Colombia, Malta, Malta, Cyprus, Costa Rica, the Netherlands, Spain, Turkey, Israel, Switzerland, and Mexico, do not provide paid parental leave to women who give birth at all.

We can assume that the length of maternity leave combined with a high level of wage compensation to women during this period are important in terms of regulating reproductive behavior and stimulating fertility.

Other measures to support families with children in general and families with many children in particular

I GROUP: TFR above 2.1 / Positive TFR dynamics

As we have previously noted, **Kazakhstan** is the only country with progressive TFR growth in the period under consideration. Despite this, scientists state that demographic policy in the country is fragmented, its goals are practically not voiced within the framework of state programs or concepts, and its implementation takes place within the framework of other directions of socio-economic policy (Panzabekova, Khalitova, 2021). Nevertheless, the state stimulates fertility through a system of state benefits, social payments, measures

Table 3. Paid maternity, parental and home care leave available to mothers, 2022, weeks

Place	Country	For maternity		For childcare		Total paid vacation		Place	Country	For maternity		For childcare		Total paid vacation	
		Weeks	Payment, %	Weeks	Payment, %	Weeks	Payment, %			Weeks	Payment, %	Weeks	Payment, %	Weeks	Payment, %
1	Slovakia	34.0	75.0	130.0	32.7	164.0	41.5	23	Luxembourg	20.0	100.0	26.0	67.1	46.0	81.4
2	Finland	17.5	74.6	143.5	18.7	161.0	24.8	24	France	16.0	91.4	26.0	13.5	42.0	43.2
3	Hungary	24.0	100.0	136.0	40.8	160.0	49.7	25	United Kingdom	39.0	29.5	0.0	0.0	39.0	29.5
4	Bulgaria	58.6	90.0	51.9	44.5	110.4	68.6	26	Belgium	15.0	64.7	17.3	20.3	32.3	40.9
5	Romania	18.0	85.0	90.7	85.0	108.7	85.0	27	Iceland	26.0	71.3	6.0	71.3	32.0	71.3
6	Latvia	16.0	80.0	78.0	46.3	94.0	52.0	28	Ireland	26.0	25.7	5.0	25.7	31.0	25.7
7	Norway	18.0	100.0	68.0	34.0	86.0	47.8	29	Portugal	6.0	100.0	24.1	59.6	30.1	67.7
8	Estonia	14.3	100.0	67.9	100.0	82.1	100.0	30	Chile	18.0	100.0	12.0	100.0	30.0	100.0
9	Czech Republic	28.0	63.7	40.6	88.2	68.6	78.2	31	New Zealand	26.0	48.9	0.0	0.0	26.0	48.9
10	Korea	12.9	83.7	52.0	44.6	64.9	52.4	32	Australia	12.0	43.1	6.0	43.1	18.0	43.1
11	Lithuania	18.0	77.6	44.0	77.6	62.0	77.6	33	Colombia	18.0	100.0	0.0	0.0	18.0	100.0
12	Austria	16.0	100.0	44.0	71.2	60.0	78.9	34	Cyprus	18.0	72.0	0.0	0.0	18.0	72.0
13	Germany	14.0	100.0	44.0	65.0	58.0	73.4	35	Malta	18.0	86.3	0.0	0.0	18.0	86.3
14	Japan	14.0	67.0	44.0	59.9	58.0	61.6	36	Costa Rica	17.3	100.0	0.0	0.0	17.3	100.0
15	Croatia	30.0	100.0	26.0	62.0	56.0	82.4	37	Netherlands	16.0	100.0	0.0	0.0	16.0	100.0
16	Sweden	12.9	77.6	42.9	57.2	55.7	61.9	38	Spain	16.0	100.0	0.0	0.0	16.0	100.0
17	Slovenia	15.0	100.0	37.1	100.0	52.1	100.0	39	Turkey	16.0	100.0	0.0	0.0	16.0	100.0
18	Poland	20.0	100.0	32.0	67.5	52.0	80.0	40	Israel	15.0	100.0	0.0	0.0	15.0	100.0
19	Greece	43.0	65.1	8.7	42.2	51.7	61.3	41	Switzerland	14.0	53.9	0.0	0.0	14.0	53.9
20	Canada	16.0	39.5	35.0	44.8	51.0	43.2	42	Mexico	12.0	100.0	0.0	0.0	12.0	100.0
21	Denmark	18.0	50.7	32.0	50.7	50.0	50.7	43	USA	12.0	0.0	0.0	0.0	0.0	0.0
22	Italy	21.7	80.0	26.0	30.0	47.7	52.7	Source: Paid maternity, parental and home care leave available to mothers, in weeks, 2022. Parental Leave Systems. Available at: https://worldpopulationreview.com/country-rankings/maternity-leave-by-country							

to promote employment and tax benefits, as well as other social protection measures at all stages of citizens' life.

In addition to maternity and childcare payments (up to one year), the system of social support for families in Kazakhstan provides for a progressive birth allowance (for the first, second and third child, it is 110.8 thousand tenge, for the fourth and more children – 183.8 thousand tenge), subsidization of mandatory pension contributions for women engaged in caring for a child up to one year of age in the amount of 10% of average monthly income. In 2020, a new type of allowance was introduced, which is assigned without regard to income in a differentiated amount depending on the number of children in the family (for families with 4 children it is 16.03 monthly calculation index (MCI), with 5 children – 20.04 MCI, with 6 children – 24.05 MCI, with 7 children – 28.06 MCI, with 8 and more children – 4 MCI for each child)[10]. There is also a state IVF program for families wishing to have children.

Israel is among the developed countries. The population has undergone a "second demographic transition" and the birth rate should be decreasing every year. However, the TFR rose from 2005 (2.842) to 2016 (3.278). There has been a steady decline only since 2019 (3.215), and in 2023, the TFR is 2.917[11], which also corresponds to "expanded reproduction". Israelis manage to contain the factors that determine the global dynamics of fertility decline against the backdrop of increased socioeconomic well-being (Sitkovskii, 2023). Scholars emphasize the following reasons for Israel's fertility success (Haivry, 2018):

• Awareness of the imminent end of civilization due to low birth rates and the continuous broadcasting of this message through the media by government and media figures;

• cultural and historical features of Jews (combination of values of individualism and many children);

• High birth rate among ultra-Orthodox Jews serves as a model for less religious families;

• Lack of psychological attitudes toward a certain number of children;

• Highly developed and free infertility medicine (first place in the world in terms of treatment per capita);

• Child-centered culture allows single women to use assisted reproductive technologies, which is also encouraged by religious society (Sitkovskii, 2023; Haivry, 2018).

Families with at least four children in Israel are considered large families. State economic measures to support them include allowances and tax benefits.

Monthly payments for children under 18 in Israel are small, not even covering 1/10th of the cost of a child (in 2023, 167 shekels per month for the first child, 207 for the second, third and fourth, and again 167 shekels for the fifth and subsequent children[12]). Nevertheless, parents of five children can afford not to work, receiving child allowances and additional payments to ensure a living wage[13]. In ultra-Orthodox families (in which, as a rule, half of the fathers and three-quarters of the mothers work), they amount to an average of 24% of the family budget, while in the rest – 9%[14]. In addition, families with many children receive a one-time allowance each year (usually in August and September) to help each child prepare for school.

[10] https://www.zakon.kz/obshestvo/6414121-aygerim-abdrashitova-kak-v-kazakhstane-povyshayut-rozhdaemost.html

[11] https://database.earth/population/israel/fertility-rate

[12] The amount of child allowance. Israel National Insurance. (Electronic resource). Available at: https://www.btl.gov.il/RussianHomePage/Benefits_ru/Yeladim_ru/Pages/shiureHakitzba_ru.aspx (accessed: March 15, 2024).

[13] Gel'man Z. (2006). How fertility is encouraged in Israel. *Jewish Observer*. August. 16/131. Available at: http://jewukr.org/observer/eo2003/page_show_ru.php?id=1674

[14] Chapter 3: Standard of Living / Statistical Report on Ultra-Orthodox Society in Israel. The Israel Democracy Institute: 2022. Available at: https://en.idi.org.il/haredi/2022/?chapter=48265 (accessed: March 15, 2024).

In addition to cash benefits, large families are entitled to substantial tax exemptions (including VAT refunds), which are the main way to equalize their financial situation. Nevertheless, having many children in Israel also leads to a decrease in the standard of living and quality of life (Sitkovskii, 2023).

II Group: TFR more than 2.1 / Negative TFR dynamics

This group includes some Gulf Arab countries as oil-exporting states with mono-industry economies but high per capita GDP and levels of social guarantees, education and health care.

In **Saudi Arabia**, it is customary to have large families (8–10 children). Childbirth is supported by the state in every possible way. Giving birth and raising children is considered a woman's primary task. However, Saudi women are given only 10 weeks of fully paid maternity leave. The father can take 3 days of maternity leave. Women who have children with special developmental needs are entitled to 1 month of additional paid leave after the end of the main parental leave, as well as an additional unpaid month[15]. The state pays a lump sum of 3 thousand U.S. dollars to a pregnant woman and 200 U.S. dollars every month, and 300 U.S. dollars to an unemployed mother[16].

Kuwait. One tenth of the government's revenues is allocated to a special fund for future generations. Support measures are the following[17]:

1. Wedding Loan (240 thousand U.S. dollars). Only a token amount of about 20 dollars is deducted from the newlywed's paycheck each month.

2. Housing loan for construction of a house up to 1 million U.S. dollars. Depending on oil prices (when they rise), the state, using its excess revenues, partially or fully pays for the population's loans.

3. For the birth of a child, the state opens a regularly replenished deposit in the bank in the amount of 3 thousand U.S. dollars until the child's adulthood.

4. In case the second and subsequent children reach the age of 6 years, the state doubles the amount of funds (up to 6 thousand U.S. dollars). This is justified by the high level of child mortality in the country.

5. If there are 5 children, each child is paid 200 U.S. dollars monthly until they start working[18]. And non-working mothers with many children are entitled to financial incentives in the amount of 300 U.S. dollars monthly[19].

6. Every child has the right to free education, including in other countries at the expense of the "fund for future generations".

7. Free medical care is provided, if necessary, it is in foreign clinics.

Despite active state support for families with children and high living standards of citizens, fertility in these countries is steadily declining.

III GROUP: TFR less than 2.1 / Positive TFR dynamics

In general, the European Union countries record a 5.5% increase in the fertility rate in 2021 (1.520) compared to 2000. Let us focus on the countries determining the favorable trend.

For children residing in **Germany**, parents receive allowance until the age of 18, and in case of further education – until the age of 25. The amount of child allowance is almost half of the minimum wage (for the first and second child – about 210 U.S. dollars monthly) and increases for each subsequent child. At the birth of the third child the allowance increases by 15 U.S. dollars, starting from

[15] Afanas'ev S.A. Pregnancy and childbirth in Saudi Arabia. Available at: https://www.insure.travel/sa/health/pregnancy-maternity

[16] https://dzen.ru/a/WsjmAGEEk4W2XzwI

[17] In which country is having children profitable? Available at: https://news.rambler.ru/other/39408780-v-kakoy-strane-rozhdenie-detey-prinosit-pribyl/

[18] Kuwait: When petrodollars go to the common good. Available at: https://www.onetwotrip.com/ru/blog/guides/asia/kuwait-example-for-follow/?srsltid=AfmBOop6UbeaCA-S3A6aPSbD6rKka8VmfJRp1MBLLY-PNSXEuAmW7D76

[19] Asylkhanova Zh. How much the state transfers to children in other countries of the world. Available at: https://www.inbusiness.kz/ru/last/skolko-perechislyaet-gosudarstvo-detyam-v-drugih-stranah-mira

the fourth child the monthly payment will be about 250 U.S. dollars. At the same time, the amount of income per child that is not taxed increases, as well as the amount of money for child care, education, or training. Parents can benefit from child allowances or exempt from tax the portion of income planned for children (Voskolovich, Askhabaliev, 2021).

Germany is one of the few European countries where care allowance is paid even to mothers who have never worked. We should remember that parental leave can last until the child reaches the age of three.

In addition, there are compensations for education and extracurricular activities (up to 140 U.S. dollars per month), subsidies and various social packages. For example, if you have a low financial status, you can get clothes for pregnant women and newborns[20].

In **France**, one in five families with children is a large family (Voskolovich, Askhabaliev, 2021). They receive 46% of the total target budget allocated to families with children. The system of encouraging parents to childbearing in this country is quite diverse and complex and is characterized by special attention to families with many children.

Most family allowances in France are based on the number of children in the family, without taking into account the parents' income. With the appearance of the second child there is an additional allowance up to the age of three, assigned to the parent regardless of their employment. There is a separate allowance for single mothers, state support for mothers who are unable to receive alimony, and others. The feature of French legislation in the field of family support is that parents with two dependent children under the age of 20 can claim family allowances, regardless of the parents' income level. For the second child they pay 150 U.S. dollars, for the third – 250 U.S. dollars, each next child adds about 200 U.S. dollars to the family budget. At the same time, the amount of benefits increases when a child reaches the age of 14 (Voskolovich, Askhabaliev, 2021).

An important tool for supporting families with children in France are various kinds of allowances that compensate for the costs associated with paying nannies to parents who have returned to work.

For low-income families with children aged 6 to 18, an allowance is available to cover part of the high costs of starting the school year. It is paid every year in August. In 2022, the amount of assistance provided was 376.98 euro for children aged 6 to 10, 397.78 euro for children aged 11 to 14, and 411.56 euro for those aged 15 to 18[21].

Another instrument of family support in France is the additional family allowances for families with three or more children. These payments are synchronized with the level of income, but only 17% of large families are deprived of them. They are paid in the amount of about 200 U.S. dollars after the third, fourth and subsequent child reaches the age of three[22].

Large families receive pension benefits – an additional 10% to the basic pension for women who have raised three children and another 5% for each subsequent child, as well as pension insurance for housewives with children (for low-income families).

If a large family decides to change its place of residence, the state provides a subsidy (in the amount of 1,200 U.S. dollars) for moving[23]. Tax benefits are also significant in France: parents of four children are exempt from paying taxes.

Family and population policy in France is considered to be one of the most effective, which has led to an increase in the birth rate in its time.

[20] Arshinova I.A. In which country is having children profitable? Available at: https://medaboutme.ru/articles/v_kakoy_strane_rozhdenie_detey_prinosit_pribyl/

[21] https://www.mes-allocs.fr/guides/aides-sociales/

[22] Zakutin A. Experience of supporting large families abroad. France, Australia, USA, Slovenia. October 31, 2016. Available at: https://katehon.com/ru/article/opyt-podderzhki-mnogodetnyh-semey-za-rubezhom

[23] Arshinova I.A. In which country is having children profitable? Available at: https://medaboutme.ru/articles/v_kakoy_strane_rozhdenie_detey_prinosit_pribyl/

In **Austria**, the amount of child benefits increases in proportion to the order of birth and the age of the child (after the age of 10)[24]. The amount of allowance increases arithmetically with the third and subsequent children. A gift of 3 thousand U.S. dollars is provided for each newborn child. If triplets or more children are born at the same time, this amount is paid to the family annually until the children reach the age of 16. Childcare allowances can be received not only by parents, but also by grandparents and nannies. This amount does not exceed 212 U.S. dollars per week. Schoolchild care is 15% cheaper[25] .

In addition to the allowance until the age of 19 for all children, students are incentivized in Austria: up to the age of 27, university students receive additional subsidies, reducing the financial burden of parents.

Sweden confidently holds the second place in childbirth among all European countries. It happens not only due to allowances and material assistance, but rather due to a long-paid childcare leave (18 months). It can be taken in installments up to the child's 8th birthday, and the father is obliged to spend at least 3 months with the child. Various types of social assistance and services for parents increase the comfort of motherhood and fatherhood for Swedes. The state also supports families with four or more children (payment per child is 615 euro for 4 children, 858 euro for 5 and 1101 euro for 6) (Andryushina, Lutsenko, 2020).

For a long time, **Greece** lacked a systematic state policy to stimulate fertility, as traditional Orthodox values were strong, with an orientation towards multi-generational, large families. However, modern research proves that the country is facing an outflow of young people as a result of the economic crisis, and those left behind are having fewer and fewer children. More than a quarter of Greece's population is over 65 years old, and the national statistics agency Elstat predicts that by 2030 the country will be the most aging in Europe. In this regard, a separate Ministry of National Cohesion and Family was established in 2023. The aim of the new structure is to implement a long-term program to create conditions for increasing the birth rate. The new Ministry of Family Affairs will work to provide jobs for young families, provide low-interest housing, encourage fertility through higher child allowances and provide places in public kindergartens and schools.

In 2020, the Greek authorities introduced a maternity allowance of 2,000 euro. And in January 2024, its amount for the first newborn in the family was increased to 2,400 euro, the second – to 2,700 euro, the third – to 3,000 euro, the fourth and subsequent – to 3,500 euro. The announced measure of social support will affect about 300 thousand families in the next two years. The state allocates about 90 million euro for the payment of benefits this year[26].

Slovenia has a family policy aimed at creating favorable conditions for both professional and family responsibilities and horizontal redistribution of income in favor of families with children. Slovenia is still one of the countries with one of the highest employment rates of mothers with young children and a small gender pay gap in the EU. The country provides benefits for parents, assistance at the birth of a child, childcare allowance, allowances for large families, additional allowance in case a parent leaves his or her job fully or partially to raise children. The amount of child allowance for a child from 3 to 12 years of age is 8–9% of the average wage in Slovenia (Andriushina, Lutsenko, 2020).

[24] Ibidem.

[25] Asylkhanova Zh. How much the government transfers to children in other countries around the world. Available at: https://www.inbusiness.kz/ru/last/skolko-perechislyaet-gosudarstvo-detyam-v-drugih-stranah-mira

[26] Baikov I. Greece increased the birth allowance for the birth of a child. Available at: https://www.pnp.ru/in-world/v-grecii-uvelichili-posobie-pri-rozhdenii-rebenka.html

One of the parents has the right to work part-time until the child reaches the age of three. This period may be extended until the youngest child reaches the age of six if there are two or three children in the family. If there are four or more children in the family, one of the parents has the right not to work. If a child has a disability, the right to work part-time for a parent may be extended until the child reaches the age of 18. In all these cases, the employer guarantees payment for the time actually worked and insurance compensation is paid for the remaining part of the full-time work.

Since 2007, Slovenia has encouraged employers with tax incentives when they comply with "family principles at work": 1) having flexible working hours; 2) granting leave for the adoption of a child; 3) part-time work for employees with an incapacitated family member and assistance in caring for him/her; 4) providing childcare services by the company (e.g., partial payment for babysitting), etc. (Andryushina, Lutsenko, 2020).

Slovenia provides benefits for low-income families with many children – an annual allowance for families with three or more children under the age of 18 or 26 (if the child is a full-time student), if the income per family member is below 64% of the average monthly income in the country. The amount of the allowance for families with three children is 395 euro and for families with four or more children 480 euro[27].

In **Belarus**, the lump-sum benefit for the birth of the first child will amount to 4476.4 Belarusian rubles (more than 120 thousand Russian rubles) in 2025, and at the birth of the second and subsequent children, it is by 30% more: 6266.96 Belarusian rubles (about 170 thousand Russian rubles). Child care allowances for children under 3 years of age will also increase by 11% on average in 2025 and will amount to 861.42 Belarusian rubles (23.3 thousand Russian rubles) for the first child, 984.48 Belarusian rubles (26.7 thousand Russian rubles) for the second and subsequent children, and 1107.54 Belarusian rubles (30 thousand Russian rubles) for a disabled child[28].

In 2015, the country introduced an additional measure of state support for large families – a lump-sum provision of non-cash funds (family capital) to families upon the birth or adoption of the third or subsequent children. From January 1, 2025, it amounted to 31,480 Belarusian rubles (853 thousand Russian rubles). Family capital funds are provided to families for use in the Republic of Belarus in full or by installments in a non-cash procedure in accordance with the legislation in one or more areas: improving housing conditions; receiving education; receiving medical care; purchasing goods intended for social rehabilitation and integration of disabled persons into society; receiving services in the sphere of social services; formation of accumulative (supplementary) financial support for families with many children[29].

In **Latvia**, parents are entitled to a payment of about 500 U.S. dollars for each newborn child. Childcare allowance is calculated on the basis of salary, but you can choose the method and duration of its receipt: either until the child is one year old (in the amount of 60% of the average salary), or until the child is one and a half years old (in the amount of 43.75%). "Children's money" is paid monthly until the child is 15 years old or until the child is 20 years old (if the child is studying but has not had time to marry). The payment increases in proportion to the order of birth. However, the amount does not change after the fourth child. The age of older children does not affect the amount

[27] Zakutin A. Experience of supporting large families abroad. France, Australia, USA, Slovenia. October 31, 2016. Available at: https://katehon.com/ru/article/opyt-podderzhki-mnogodetnyh-semey-za-rubezhom

[28] State guarantees for large families. Website of the Ministry of Labor and Social Protection of the Republic of Belarus. Available at: https://mintrud.gov.by/special/ru/gosudarstvennie-garantii-mnogodetnim-semyam-ru/view/semejnyj-kapital-4222/#to_top

[29] State guarantees for large families. Website of the Ministry of Labor and Social Protection of the Republic of Belarus. Available at: https://mintrud.gov.by/special/ru/gosudarstvennie-garantii-mnogodetnim-semyam-ru/view/semejnyj-kapital-4222/#to_top

of allowance for the next child, even if they have grown up and become parents themselves. For large families, payments are made for each child from 1 year to 20 years of age[30].

The impact on mentality, on value orientations has shown its effectiveness in **Georgia** by the example of the so-called "Georgian demographic miracle". When Patriarch Ilia II publicly stated that he was ready to personally baptize every third Georgian child, the birth rate in the country increased by more than 25% and the number of abortions was halved[31]. The patriarch has over 40,000 godchildren[32].

In September 2021, the Mortgage Loan Subsidy Program for Large Families was launched in Georgia[33]. It provides a subsidy for interest accrued on mortgage loans taken out by large families and families with newborns, single or widowed parents for 60 months after the loan is issued. Within a year after the birth of a child, a family can apply to a bank, take out a mortgage loan and buy a new apartment or secondary housing, or build a private house.

From January 1, 2023, every third and subsequent newborn in Georgia will be provided with a lump sum of 1,000 GEL[34]. School teachers will receive full salary during maternity and postnatal leave. From 2025, the Georgian authorities plan to start financing artificial insemination procedures for everyone.

Systematizing the key support measures for families with children in **Russia**, based on current Russian legislation[35], as well as information from the Russian Ministry of Labor, the Federal Tax Service, the FIS and the state services portal, we can distinguish two groups of benefits and payments for children: lump-sum and monthly. The former include:

– birth allowance;

– maternity (family) capital (associated with it is a monthly payment in connection with the birth (adoption) of a child until the child reaches the age of 3 years, which is paid from the maternal capital funds);

– temporary disability allowance for child care;

– allowance when a child is placed in foster care;

– pregnancy allowance for the wife of an active-duty soldier.

The second group consists of:

– maternity allowance;

– lump-sum allowance at the birth of a child. This type of benefit is available to families residing in the country, regardless of income level and number of children;

– child care allowance for children up to 1.5 years of age;

– single allowance for children under 17 and for pregnant women;

– payment in connection with the birth (adoption) of the first child;

– allowance for the child of a serviceman performing conscripted military service;

– allowance for non-working able-bodied persons caring for a disabled child under the age of 18 or a disabled person from childhood of group I[36].

[30] Arshinova I.A. In which country is having children profitable? Available at: https://medaboutme.ru/articles/v_kakoy_strane_rozhdenie_detey_prinosit_pribyl/

[31] My godfather is the Patriarch! Christening in Georgia. Available at: https://radiovera.ru/moj-krestnyj-patriarh-krestiny-v-gruzii.html

[32] Patriarch of Georgia Ilia II turned 90 years old. Available at: https://mir24.tv/news/16536797/patriarhu-gruzii-ilie-vtoromu-ispolnilos-90-let

[33] The state program of soft mortgage loans will start in Georgia in September. Available at: https://sputnik-georgia.ru/20210830/gosprogramma-lgotnykh-ipotechnykh-kreditov-startuet-v-gruzii-s-sentyabrya-259158417.html

[34] Lump-sum payment for each third and subsequent child. Available at: https://jnews.ge/103886/

[35] Article 11 of Federal Law 81-FZ, dated May 19, 1995 "On State Benefits to Citizens with Children"; Federal Law 255-FZ, dated December 29, 2006 "On Compulsory Social Insurance for Temporary Inability to Work and in Connection with Maternity"; Order of the Ministry of Labor of Russia 668n, dated September 29, 2020 "On Approval of the Procedure and Conditions for the Assignment and Payment of State Benefits to Citizens with Children".

[36] https://www.garant.ru/article/1677828/

Table 4. Basic child benefit amounts in 2024 and for 2025

Benefit	2024	2025
Maternal capital		
For the first child	630380.78 rubles	690266.95 rubles
For the second child	833024.94 rubles	912162.09 rubles
Additional payment for the second child to those who received maternity capital for the first child	202643.96 rubles	221895.14 rubles
Lump-sum benefits for children		
At the birth or adoption of a child	24604.30 rubles	26941.71 rubles
When adopting a child 8 years of age or older, a disabled child, or multiple sibling children	187996.90 rubles	205856.61 rubles
Pregnant wife of a conscripted serviceman	38.963.37 rubles	24665.0 rubles
Monthly allowances for children		
Child care up to 1.5 years for non-working parents	From 9227.94 to 18454.48 rubles	From 10103.83 to 18454.48 rubles
For the child of an enlisted serviceman	16698.63 rubles	18285.0 rubles
Source: SFR website, Available at: https: sfr.gov.ru; KonsultantPlus, Available at: https://www.garant.ru/article/1677828/https://www.consultant.ru/legalnews/27800/		

Table 4 shows the amount of basic child benefits.

Russia has the following mechanisms of assistance to families with three or more children according to Presidential Decree 63, dated January 23, 2024, "On measures of social support for large families"[37]:

– families with three or more children are entitled to a free land plot or its monetary compensation;

– pension benefits: moms of three children retire at 57, four at 56, and five or more at 50;

– for a family with many children, the state is prepared to repay 450,000 rubles of mortgage debt;

– provides for an increase in the standard tax deduction for the third and subsequent children more (3,000 rubles);

– in addition to the general property tax deduction, large families are entitled to an additional deduction based on the number of children, for which an application should be submitted as for tax benefits;

– if a large family has a plot of land, the land tax should be paid not on the entire area, but less six acres;

– a parent of three children under the age of 12 may take vacation at any time, even against an approved schedule.

In addition to federal state support programs, there are allowances and subsidies at the regional level, such as free meals at school, free school uniforms or compensation for their purchase once every two years, subsidies for utility bills, exemption from transport tax, discounts on parking fees, free travel on public transport, benefits when visiting theaters and museums.

IV GROUP: TFR less than 2.1 / Negative TFR dynamics

Japan has an extremely low fertility rate of 1.39 children per woman. Specialists attribute this to the lack of state support, which, in turn, is due to the matrimonial culture of the country (Streltsov, 2007).

For instance, maternity leave of 14 weeks is provided with 60% of the mother's previous salary, and nursing leave – 40%. At the same time, 30% will be paid directly during the leave, and the remaining amount – within 6 months after the mother returns to the workplace. It is only possible to receive a leave allowance if both parents are fully employed before the maternity leave. Temporary workers (even if it is the father) who work part-time are not entitled to benefits. At the same time, the

[37] On measures of social support for large families: Presidential Decree 63, dated January 23, 2024. Available at: http://www.kremlin.ru/acts/bank/50259

specifics of the labor market in Japan are such that most often such a worker is a woman with a grown-up child, which reduces the motivation to have a second child (Novikova, 2013).

For the birth of the third and subsequent child, the amount of the lump-sum benefit increases by more than 1.5 times compared to the first and second child[38]. In 2022, the Government of Japan decided to start paying a birth allowance of 100,000 yen to pregnant women[39]. In April 2023, it was increased from 420,000 to 500,000 yen[40].

Japan's parliament passed a bill to revise the law on child-rearing allowances in the summer of 2024. It was decided to abolish income limits on child allowances and extended the period of child allowances until the child reaches the age of 18[41].

Only one in four Japanese families has a child, and more than 30% of children in orphanages are "abandoned". Adoption is extremely uncommon in Japan[42].

South Korea's total fertility rate continued declining in 2022, decreasing by a further 0.03 to 0.78 (i.e., an average of 7–8 children per 10 Korean women) according to statistics this was the lowest among all developed countries in the Organization for Economic Cooperation and Development[43].

The South Korean government is expanding financial incentives to increase the country's birth rate. One of the country's main birth benefits is the "childbirth and parenting allowance". The amount of the payment depends on the number of children in the family and the parents' income. Families are usually paid a one-time allowance, but there are also monthly payments for a year after birth. The amount of allowances depends on the family income and the number of children. For example, a child born in 2024 can receive a total of 29.6 million won (about 22,100 U.S. dollars) in cash support within eight years of birth. The financial support includes a lump-sum payment of 2 million won to parents at the birth of a child. The second child receives 3 million won, up 1 million won from last year[44].

In addition, there are several other allowances in Korea to support families with children, such as college tuition allowance for children under 18 and secondary vocational education allowance for children under the age of 24. Their amount also depends on the family's income.

The **USA** has no unified system of social support for families, subsidies can be received from the state, private companies, charitable organizations and the church. Parents are supported only by tax benefits (about 100 U.S. dollars). Everything else falls on the shoulders of the family budget. The state helps low-income families with food stamps, reduced-price housing, utility subsidies, limited medical care, priority for a place in free kindergarten, and family planning counseling. Public and private organizations can offer a range of services such as childcare, legal, psychological, educational and employment assistance for parents[45].

The United Kingdom has a number of tools of financial and material assistance to families with children, tax benefits (presented on the government website[46]), which depend on the employment of the mother before pregnancy and the amount of total family income. Some categories of moms can be

[38] Arshinova I.A. In which country is having children profitable? Available at https://medaboutme.ru/articles/v_kakoy_strane_rozhdenie_detey_prinosit_pribyl/

[39] https://tass.ru/obschestvo/16155363

[40] https://www.nippon.com/ru/japan-data/h01641/

[41] Japan passes new law to expand support measures for families with children. Available at: https://www3.nhk.or.jp/nhkworld/ru/news/0607EE73/

[42] Arshinova I.A. In which country is having children profitable? Available at: https://medaboutme.ru/articles/v_kakoy_strane_rozhdenie_detey_prinosit_pribyl/

[43] Demographic projects to increase fertility and support families with children in South Korea, Slovenia, Australia. Available at: https://foodwave.tilda.ws/page41407528.html

[44] Childbirth benefits to be introduced in South Korea. Available at: https://khovar.tj/rus/2024/01/vyplaty-po-rozhdeniyu-detej-vvodyat-v-yuzhnoj-koree/

[45] Arshinova I.A. In which country is having children profitable? Available at: https://medaboutme.ru/articles/v_kakoy_strane_rozhdenie_detey_prinosit_pribyl

[46] https://www.gov.uk/browse/childcare-parenting/financial-help-children

paid Start Maternity Grant, about 800 U.S. dollars at the birth of the first child. The size of "child" allowances is inversely proportional to the order of birth. There are food packages for pregnant women (up to 18 years old) and children up to 4 years old from low-income families. During pregnancy and until the child is a year old, the mother is entitled to free dental treatment. Also, part of the cost of attending kindergarten (up to 350 U.S. dollars a month) can be written off from the taxes paid by one of the parents. At the same time, they may also pay part of the cost of attending children's clubs where children go during vacations[47].

Caring for a child up to 12 years of age, if a woman does not work and devotes herself to her family, is included in the working record and is taken into account when calculating the pension. If the mother decides to work, then her position is retained for six months after childbirth, after 11 months they can offer another position in the same company, after a year the reserve of the workplace expires.

The UK government is working on new assistance programs to help offset up to 3,000 U.S. dollars of child costs per year with "child" vouchers, various compensation schemes[48].

In **Italy**, the declining birth rate is a major concern for the state, as the current fertility rate is only 1.301[49]. The average age of "first-time" moms in Italy is 31, the highest in Europe. The main reason why women in Italy have no children is because they are financially unprepared to raise a child, as the government does not help pay for the cost of children[50].

In **Spain**, motherhood is also expensive and is almost entirely the responsibility of the family. For this reason, there is a demographic decline among the indigenous population. It is only possible to give birth and raise a child without a drastic reduction in income if both parents are highly paid professionals. Childbirth allowance (1,650 euro) and childcare allowance (16 weeks, 200 euro per month) are only available to mothers who have been employed before the maternity. The child allowance is about 1% of the average wage in Spain (Andriushina, Lutsenko, 2020).

If the mother did not work or her income in the previous two years did not exceed a certain amount, there is no payment. Up to three years old children are entitled to about 60 U.S. dollars a month from the state, and if the mother decided to combine child care and full-time work, then plus another 115 U.S. dollars[51]. At the same time, attendance at kindergarten is three times more expensive. After the age of three, the state helps only single mothers: about 800 U.S. dollars a year until the child reaches the age of 6[52].

Let us consider a number of countries from this group with low fertility rates and negative fertility dynamics, but having, in our opinion, noteworthy family and demographic policy instruments that have demonstrated positive effects in certain periods in the past and may do so in the future.

The **United Arab Emirates** (UAE), one of the rich oil-producing countries with strong Muslim traditions, fell into this group. Only every third resident of this country is its citizen (only a child born to two citizens of this country can become a citizen) and has the right to enjoy all the benefits of social policy. Huge revenues from the oil and gas industry allow the state to pursue an active and

[47] Arshinova I.A. In which country is having children profitable? Available at: https://medaboutme.ru/articles/v_kakoy_strane_rozhdenie_detey_prinosit_pribyl

[48] In which country is having children profitable? Available at: https://news.rambler.ru/other/39408780-v-kakoy-strane-rozhdenie-detey-prinosit-pribyl/

[49] https://database.earth/population/fertility-rate/2023

[50] Arshinova I.A. In which country is having children profitable? Available at: https://medaboutme.ru/articles/v_kakoy_strane_rozhdenie_detey_prinosit_pribyl

[51] Ibidem.

[52] In which country is having children profitable? Available at: https://news.rambler.ru/other/39408780-v-kakoy-strane-rozhdenie-detey-prinosit-pribyl/

generous demographic policy, encouraging potential parents to procreate with the following programs[53].

1. All citizens planning to get married are given an interest-free loan from the UAE Marriage Fund (about 20 thousand U.S. dollars). It is automatically repaid by the state at the birth of the first-born child.

2. Parents are entitled from 50 thousand (for a newborn daughter) to 200 thousand U.S. dollars (for a son), and if it is necessary, it is given a small villa.

3. Opening of a newborn's account and its regular replenishment at the expense of the state. As a result, about 100 thousand U.S. dollars is accumulated in the account by the child's adulthood.

4. For infant care, UAE nationals working in private companies are entitled to a monthly allowance ranging from AED 800 to AED 3,200[54].

Nevertheless, about 15% of citizens do not take advantage of interest-free loans and free houses due to a fairly high level of family income.

Maternity leave is unavailable in the UAE.

Each student who chooses to study abroad is paid a scholarship three times higher than ordinary students, and the graduate is entitled to a substantial payment (13 thousand U.S. dollars). Medicine and education in this country are free of charge. There are scholarships for UAE citizens[55].

However, despite the national super incomes, high development level of the healthcare and education system and all the measures offered by the state to stimulate fertility, the citizens' reproductive attitudes are changing for the worse. The TFR decreased progressively (by 3 times) from 1980 (5.30) to 2024 (1.46).

Australia has several active government support programs for families with children[56]:

At the birth of a child there is a lump sum payment of 4,000 Australian (3,000 U.S.) dollars, at the birth of triplets (and more children for one birth) parents the above payment is made annually until the 16th birthday of the twins;

- "Baby Bonus" – to help families after the birth or adoption of a child;
- family tax benefits (Family Tax Benefit program);
- Child Care Benefit (CCB) – helps pay for the cost of child care services (full-day kindergartens, family child care, before- and after-school care, vacation care; services provided by grandparents, relatives, friends, and babysitters (Andriushina, Lutsenko, 2020);
- Child Care Rebate, which covers half of the cost of approved services (educational, medical, etc.);
- Jobs, Education and Training (JET) Child Care fee assistance subsidy;
- Benefits for large families are paid only to families with four or more children as of July 1, 2015[57].

In **China**, the "One Family, One Child" policy began in 1974, with severe fines (of 4–8 salaries),

[53] In which country is having children profitable? Available at: https://news.rambler.ru/other/39408780-v-kakoy-strane-rozhdenie-detey-prinosit-pribyl/; Asylkhanova Zh. How much the state transfers to children in other countries of the world. Available at: https://www.inbusiness.kz/ru/last/skolko-perechislyaet-gosudarstvo-detyam-v-drugih-stranah-mira; Arshinova I.A. In which country is having children profitable? Available at: https://medaboutme.ru/articles/v_kakoy_strane_rozhdenie_detey_prinosit_pribyl/

[54] State program to support UAE citizens. Available at: https://www.uae-consulting.com/novosti/gosudarstvennaya-programma-podderzhki-grazhdan-oae-1956.html

[55] Fidler A. What privileges UAE citizens have. Available at: https://uaetours.ru/kakie-privilegiya-imeyut-grazhdane-oae/; Anuchkin A. Education system in the UAE: how much a foreigner will have to pay and how to choose your own university. Available at: https://synergytimes.ru/learn/sistema-obrazovaniya-v-oae-skolko-pridyetsya-platit-inostrantsu-i-kak-podobrat-sebe-vuz

[56] Government benefits and payments available to families in Australia. Available at: http://www.australia.gov.au/information-and-services/benefits-and-payments/families; Zakutin A. Experience of supporting large families abroad. France, Australia, USA, Slovenia. October 31, 2016. Available at: https://katehon.com/ru/article/opyt-podderzhki-mnogodetnyh-semey-za-rubezhom

[57] Demographic projects to increase fertility and support families with children in South Korea, Slovenia, Australia. Available at: https://foodwave.tilda.ws/page41407528.html

forced abortion. A second child was allowed if the first girl was born in families from rural areas where both parents were only children. As a result, there is a pronounced gender disproportion (33 million more men than women) and the share of pensioners will amount to a quarter of the population in a few years. The sanctions program was abolished in 2015, and fines were retained for the birth of the third and subsequent children. However, the positive effect of the abolition of penalties was short-lived and lasted only a couple of years: the birth rate continued to fall and, for example, at the end of 2020, the number of births fell by 20% to 12 million newborns (the lowest figure since 1961)[58]. The Chinese have adopted a one-child mindset over the previous 35 years.

By allowing the younger generation to have a third child in 2021, the government has developed a number of additional "incentives" that could increase the country's birth rate:

1) lump-sum allowance for the birth of a second child up to 2 thousand U.S. dollars;

2) large families are provided with express registration at the place of residence, enrollment of children in kindergartens, schools and universities, and when applying for a job;

3) the Government will consider granting a tax deduction for expenses for the maintenance of children up to the age of three;

4) when providing social housing, the number of minor children in the family is taken into account;

5) the share of expenditures on the provision of education at school has been revised, taking into account the number of children in the family, and control over pricing for educational services has been strengthened[59].

In addition, the authorities introduced a ban on abortion. Nevertheless, despite all the measures taken, China's population is declining for the second year in a row[60]. Demographers at Tsinghua University predict that in the next five years the rate of population decline in China will increase, and this process will noticeably accelerate by 2050. By the end of this century, China's population will be below 800 million people, and its share of the global population will fall from the current 19% to around 7%. China will no longer be the world's most populous country, falling to the third position after India and Nigeria[61].

Norway has the following support measures for families with children:

1. Parents receive 150 U.S dollars per month for each child (up to the age of 18). Additional supplementary payments are provided for living in northern regions[62].

2. An unemployed mother at the birth of a child receives a lump-sum payment of about 5 thousand U.S. dollars, and an employed mother (and such in Norway is the majority, as the age of the first birth is approaching 30 years) – depending on the total family income. For the next forty-two weeks, they receive full wage reimbursement. Alternatively, they are offered 80% of their wages, but for one year (Andryushina, Lutsenko, 2020).

3. Women are also provided with free medical care.

4. When a child reaches one year of age, he or she is allocated a place in a kindergarten. Parents who do not receive it are compensated for the care of the baby with a monthly payment (about 560 U.S. dollars). If the child enters kindergarten or reaches the age of three, the payments are stopped.

[58] Balandin R. The third is not redundant: why is China urgently scaling back its birth control policy? Available at: https://tass.ru/opinions/12121831

[59] Ibidem.

[60] China's population declines for the second year in a row. Available at: https://www.bbc.com/russian/articles/cmjr6gzrg4lo

[61] Shchepin K. China intends to completely lift birth restrictions. Available at: https://russian.cgtn.com/news/2024-02-27/1762351956567937026/index.html

[62] Asylkhanova Zh. How much the government transfers to children in other countries around the world. Available at: https://www.inbusiness.kz/ru/last/skolko-perechislyaet-gosudarstvo-detyam-v-drugih-stranah-mira

5. Maternity leave is provided for men. Thus, fathers can spend more time with their spouses and children[63].

6. A woman is entitled to pension savings for each child born (Andryushina, Lutsenko, 2020).

We should say that free education and medical services are provided to all citizens in Norway.

Finland is a country that ranks right at the top two places in the world rankings of motherhood and childhood: in terms of convenience for mothers and the number of happy schoolchildren.

According to the Finnish Social Security website[64], parental allowance for one child is paid for a total of 320 working days. However, if there are two parents, each parent can receive parental allowance for 160 working days. Approximately 70% of Finnish fathers take advantage of this opportunity. Fathers are also entitled to a separate small allowance for fathers who live together with mom and child. It is possible to give up to 63 working days of the quota of 160 days of parental allowance to another person who takes care of the child. One can also divide the parental allowance into even shorter periods or individual days, but use it during the first two years of the child's life. If more than one child is born or adopted at the same time, you are entitled to an additional parental allowance for 84 working days for the second and each subsequent child. The rate of the allowance ranges from 311 euro to 105 euro per day, depending on income and salary. The tax-free child allowance for children up to the age of 17 increases as the family grows (94.88 euro for the first child, 104.84 euro for the second, 133.79 euro for the third, 173.24 euro for the fourth and 192.69 euro for the fifth and subsequent children)[65].

In addition to financial incentives, the state offers a "maternity package" (a box of quality clothing and care products). Instead of it, it is possible to choose a monetary compensation of 170 euro. It is necessary to start visiting a gynecologist in the first 4 months of pregnancy to receive the box. Moreover, free baby rooms with babysitters in public places and equipped facilities for breast milk decanting at work are widespread in Finland.

Poland was out of the group of countries with positive ten-year dynamics of the RMS indicator. But it is worth mentioning that the country experienced a 13% increase in fertility rate in the periods 2003–2010 (from 1.23 to 1.41) and 2013–2017 (from 1.29 to 1.47). Serious measures to support families with children have played an important role[66].

1. With the birth of a third child, the family's mortgage debt is completely waived.

2. The "500+" program allows parents who decide to have a second and further child to expect an increase of 500 PLN (about 145 U.S. dollars) every month until the age of 18. The same allowance can be received for the first child if the income per family member does not exceed 200 U.S. dollars. The payments are tax-free and indexed according to inflation. Thus, it is possible to count on 30,000 U.S. dollars or more by the child's 18th birthday[67].

3. The tax benefit[68] applies to each child up to the age of 18 or up to the age of 25 (if they are studying and their income does not exceed PLN 3,089) and is calculated based on the results of the annual tax return. The benefit is aimed at supporting families with many children. From the third child in the family the amount to be deducted increases. After the birth of the second child, the income from which the benefit can be deducted is not limited.

[63] Sedrakyan R. World experience of demographic regulation. *Demoscope Weekly*, 717–718. February 20 – March 5, 2017. Available at: https://www.demoscope.ru/weekly/2017/0717/gazeta04.php

[64] https://www.kela.fi/

[65] Ibidem.

[66] State social benefits for children in Poland. Available at: https://accorde.pl/State-social-payments-for-children-in-Poland-ru.html

[67] Arshinova I.A. In which country is having children profitable? Available at: https://medaboutme.ru/articles/v_kakoy_strane_rozhdenie_detey_prinosit_pribyl/

[68] https://poland2day.com/kakie-vyplaty-na-detej-mozhno-poluchat-v-polshe/?lang=ru

4. The "Big Family Card" is not cash assistance, but authorization to use discounts for families with three or more children. It is offered by public institutions and private companies (movie theaters, stores, banks). As a rule, these are discounts in the range of 7–10%. They include the use of rail transport, visits to museums, sports centers, hotels, tourist excursions, language school courses and shopping in retail chains[69].

5. Allowance for hiring a nanny. It can be used by parents of children aged 20 weeks to three years who are not on maternity, paternity or teaching leave, regardless of the family's living situation. The assistance consists in compensating the nanny's services (not more than 50% of her minimum wage)[70].

6. Since March 2022, the "Mama 4 plus" project has been in force in Poland, which guarantees women who have given birth to and raised four children a pension of PLN 1,000 upon reaching the age of 60 (provided that the woman does not work and has no other sources of income)[71].

Having analyzed the experience of various countries in supporting families with children, including large families, we have summarized the obtained material and presented it in *Table 5*.

Conclusion

Thus, it is possible to identify a wide range of financial and organizational instruments to stimulate fertility and support large families in various countries. However, taking into account the reduction practically all over the world of the indicator of children born per woman of fertile age, there are doubts about their effectiveness.

Measures of targeted support for large families are identified only in one third of the reviewed countries. The most developed policy in this area is implemented in Poland, Slovenia and France.

The study shows that Russia has the widest range of support measures for large families. However, there is a possibility of their refinement and revision. Most demographers rightly believe that modern family and demographic policy should be supplemented with a number of strategic measures in the sphere of work specifically with young people (up to 20–25 years old), including students, encouraging them to create a strong prosperous young family that will have time to give birth to three or more children (Andryushina, Lutsenko, 2020; Rostovskaya, 2022; Rostovskaya et al., 2023a; Rostovskaya et al., 2023b). In addition, they need to be updated, modified to maintain the effects of the implemented measures, since the new soon enough becomes commonplace and ceases to play the role of a motivator.

In our opinion, the following measures of support for large families in foreign countries deserve attention.

The prestige of large families and the "fashion of having many children" are elements of the necessary new "normality", which is based on confidence in the future well-being of born children. Taking into account the experience of European countries, this will be facilitated by the transition from the use of tools to increase the birth rate to a wider implementation of measures of real and direct state support for each child before he or she enters adulthood. One striking example is the opening of an account, which is replenished by the state, for each newborn child.

Institutionally, family and demographic policy should be developed and implemented by competent structures, such as specialized ministries. Such a ministry has recently been established in Greece, and there is similar experience in the Republic of Bashkortostan, where the Ministry of Family, Labor and Social Protection has been created (Voskolovich, Askhabaliev, 2021).

[69] Large Family Card (Karta Dużej Rodziny) in Poland: application, discounts and benefits. Available at: https://www.profee.com/ru/articles/karta-bolshoj-semi-karta-duej-rodziny-v-polshe-oformlenie-skidki-i-lgoty

[70] State social benefits for children in Poland. Available at: https://accorde.pl/State-social-payments-for-children-in-Poland-ru.html

[71] Ibidem.

Table 5. Fertility incentives and family policies around the world

Measures		I	II	III											IV									
	Measures to stimulate fertility	Kazakhstan	Israel	Saudi Arabia	Kuwait	Germany	France	Austria	Sweden	Greece	Slovenia	Belarus	Latvia	Georgia	Russia	Japan	South Korea	USA	United Kingdom	Italy	Spain	UAE	Australia	China	Norway	Finland	Poland
"Wedding Credit" or a special award				+	+																	+					
"Housing loan" or housing allocation				+	+																	+					
Opening of a newborn account and its regular replenishment by the state				+	+																	+					
Lump-sum payment at the birth of a child		+		+						+		+	+		+	+	+						+				
Lump-sum payment at the birth of a second child		+		+						+		+			+	+		+						+			
Benefits for pregnant women							+				+				+												
Maternity benefits			+			+	+			+	+	+	+	+	+				+						+	+	+
Monthly child care allowance, "child allowance"		+	+			+	+	+	+		+		+	+	+	+	+								+	+	
Subsidized pension contributions (up to one year)		+																									
Free education / compensation of education costs			+	+	+	+		+	+		+				+		+	+				+	+		+	+	+
Free medical care / reimbursement of expenses for medical services for a child			+	+	+				+										+				+	+		+	+	
Reimbursement of childcare costs (nannies, relatives, family clubs, etc.)							+				+												+			+	+	+

Continuation of Table 5

Measures	I		II		III														IV											
	Kazakhstan	Israel	Saudi Arabia	Kuwait	Germany	France	Austria	Sweden	Greece	Slovenia	Belarus	Latvia	Georgia	Russia	Japan	South Korea	USA	United Kingdom	Italy	Spain	UAE	Australia	China	Norway	Finland	Poland
Free dental treatment for pregnant women and after the child reaches 1 year of age																		+								
Free medical care for pregnant women		+	+	+										+							+			+		+
Tax benefits										+							+				+	+				
Support for low-income families	+	+			+	+				+				+			+	+								
Daily hot meals for children														+												
Including childcare in the employment record and in the calculation of the mother's pension														+				+								
Additional subsidies for students				+		+	+			+											+					
"Dowry Box," a gift for the birth of a child.														+											+	
Maternity capital											+			+												
Paternity leave								+																+	+	
Free IVF treatment	+												+	+												
Support measures for large families																										
Increase in lump-sum payments at the birth of the second, third and subsequent children	+								+	+	+		+	+	+											
Increase in monthly payments for the second and subsequent children	+	+	+	+	+	+	+	+		+		+			+	+										+

End of Table 5

Measures	I		II		III												IV													
	Kazakhstan	Israel	Saudi Arabia	Kuwait	Germany	France	Austria	Sweden	Greece	Slovenia	Belarus	Latvia	Georgia	Russia	Japan	South Korea	USA	United Kingdom	Italy	Spain	UAE	Australia	China	Norway	Finland	Poland
Monthly payments to a non-working mother with many children		+		+																						
Annual payments										+																
Family relocation grant						+																				
Retirement benefits						+								+	+											+
Part-time work for parents with many children										+				+												
Tax benefits		+			+	+				+				+												+
"Big Family Card" (discounts on transportation, leisure, sports, tourism, shopping, etc.)																										+
Benefits for payment of housing and utility bills														+												
Free dispensing of medicines to children under 6 years of age														+												
Partial reimbursement of transportation passes														+												
Priority admission to preschool educational institutions														+												
Free meals at school														+												
Allocation of funds for school uniforms, or preparation for school		+												+												
Free visit to museums once a month														+												
Preferential mortgage loans													+	+												+

With regard to the young family, we consider worthy of attention the measures applied in a number of Arab countries that contribute to the creation of the family base, namely the "marriage loan" or "marriage premium", which will allow a young couple not to postpone the wedding and the official registration of the marriage. This measure is particularly effective if the loan is written off at the birth of a child, and the same loan can be aimed at solving the housing problem.

High-quality and affordable medical care and the opportunity to give children a good education are traditionally significant factors in families with children. In this regard, the issue of providing medical assistance to families with children (development of the institute of family doctors and family clinics) is acutely relevant. The experience of Germany in introducing additional educational subsidies, including for additional education for families with three or more children, and of South Korea for education at universities and colleges has been successful in increasing access to education. There may be other tools, such as the creation of a fund for vocational education of children from large families. The existing quota of budget places in higher education institutions for children from large families is a good tool, but it needs to be reconsidered in the light of the accumulated experience of its application. Scholarship support for students, especially from large families, who simultaneously (or sequentially) need to provide education for several children, including in educational organizations located outside the family's place of residence, is of great importance.

Increasing opportunities for women to combine maternal and professional duties (which is extremely important for mothers with many children) in the form of compensation for babysitting services (including through the involvement of close relatives), which is also common in a number of countries, is, in our opinion, an effective measure to stimulate births of three or more children. In the UK childcare for a child up to 12 years of age is included in the mother's employment record. In Russia – the first year and a half. We consider it necessary to increase this period at least for mothers with many children, who, as a rule, take care of several small children at the same time and do not have the opportunity to start a full-fledged labor activity.

To reduce the risks of poverty of families with children and in connection with the determinant role of childbearing in the focus on the acquisition of stable financial income (Andriushina, Panova, 2019), the practice of direct monthly payments to families with many children, as in Kazakhstan, Israel, France, Poland, Kuwait, Austria, regardless of family income and before the children start working, as well as regardless of the age of older children (as in Latvia), is worthy of attention. Long paid parental leave, which can be taken by the mother, as the experience of Slovenia and Finland shows, is an important tool to motivate childbearing and large families. Scientists' calculations show that the annual budget expenditures on monthly payments for the fourth and subsequent children in the amount of the child's subsistence minimum would amount to about 10–15% of the amount that is now allocated to the "maternity capital" (Sitkovskii, 2023). When calculating the amount of allowance for a child up to 18 years of age, the idea of taking into account the age of the child, as in European countries, is promising, since parents' expenses for a teenager increase significantly.

To support families with school-age children, it is advisable to consider the possibility of providing annual "school allowances" to children from large families on the eve of the school year, as is done in Israel. In Russia, among the measures to support schoolchildren from large families is the provision of free hot meals and payment of 3,000 rubles once every two years to buy uniforms. This amount is not enough to cover the cost of buying all the necessary clothes, shoes and stationery.

Such a support measure as a payment for moving a large family is also of interest, especially if the families wish to move to remote corners of Russia or rural areas.

Among indirect support measures, the practice of multiple reduction of tax deductions for families with more than three children is interesting, as in France, Slovenia, and Poland. It is also necessary to work out the issue of a discount or refund of payments on the amount of VAT, as it is done in Israel, at least for certain categories of goods or in certain partner stores. Thus, the welfare (disposable income) of large families could be immediately increased by 20%, which would significantly reduce the financial burden on child support (Sitkovskii, 2023).

Pension benefits in Russia apply only to mothers who have given birth to three or more children. However, we believe it is reasonable to provide them also to fathers with many children, who, as a rule, have to work much harder at work and at home in order to ensure the well-being of their large family and deserve to retire earlier than others, devoting their free time to communicating with grandchildren and supporting their children who have become parents. We did not find in the literature the fact of application of this tool in foreign practices of demographic and family policy. We should also pay attention to the tax benefits in Slovenia provided to an employer who supports parents with many children through a collective agreement.

In Russia, fathers have the right to take maternity leave, but they do not use it very often. We consider the experience of Scandinavian countries on mandatory "maternity leave for fathers" worthy of attention, which would significantly ease the work of a mother with many children during the difficult period after childbirth, positively affect the psychoemotional atmosphere in the family, the relationship between father and child.

We consider it no less important to continue active efforts to strengthen and shape traditional Russian values among children and young people, including family values. Only in this case it is possible to achieve an understanding of the acute need for many children as the only way to preserve the Russian people.

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Public Opinion Monitoring of the State of the Russian Society

As in the previous issues, we publish the results of the monitoring of public opinion concerning the state of the Russian society. The monitoring is conducted by VolRC RAS in the Vologda Region[1].

The following tables and graphs show the dynamics of several parameters of social well-being and socio-political sentiment of the region's population according to the results of the latest round of the monitoring (February 2025) and for the period from February 2024 to February 2025 (the last seven surveys, that is, almost a year).

We compare the results of the surveys with the average annual data for 2000 (the first year of Vladimir Putin's first presidential term), 2007 (the last year of Vladimir Putin's second presidential term, when the assessment of the President's work was the highest), 2011 (the last year of Dmitry Medvedev's presidency), and 2012 (the first year of Vladimir Putin's third presidential term).

The annual dynamics of the data are presented for the last five years of observations: from 2020 to 2024[2].

The materials also provide an analysis of the monitoring results for the period of the special military operation. To do this, we compared the average annual data for 2024 (based on the results of three years of the SMO) with 2021 (that is, with the year preceding the launch of the SMO announced by the President of the Russian Federation on February 24, 2022). The corresponding text in the materials is given in the frame.

[1] The surveys are held six times a year in the cities of Vologda and Cherepovets, in Babayevsky, Velikoustyugsky, Vozhegodsky, Gryazovetsky, Tarnogsky Kirillovsky, Nikolsky municipal okrugs, and in Sheksninsky Municipal District. The method of the survey is a questionnaire poll by place of residence of respondents. The volume of a sample population is 1,500 people 18 years of age and older. The sample is purposeful and quoted. The representativeness of the sample is ensured by the observance of the proportions between the urban and rural population, the proportions between the inhabitants of settlements of various types (rural communities, small and medium-sized cities), age and sex structure of the Region's adult population. Sampling error does not exceed 3%.

More information on the results of VolRC RAS surveys is available at http:// www.vscc.ac.ru/.

[2] In 2020, four rounds of the monitoring were conducted. Surveys in April and June 2020 were not conducted due to quarantine restrictions during the spread of COVID-19.

In December 2024 – February 2025, the President's approval rating remained unchanged and amounted to 66–67%. The proportion of negative assessments was 18%

Over the past 12 months (from February 2024 to February 2025), the share of positive assessments of the head of state's work increased from 64 to 66%.

On average, in 2024 as compared to 2021, the share of positive assessments of the RF President's performance increased by 15 p.p. (from 52 to 67%). The share of negative judgments decreased by 12 p.p. (from 32 to 20%).

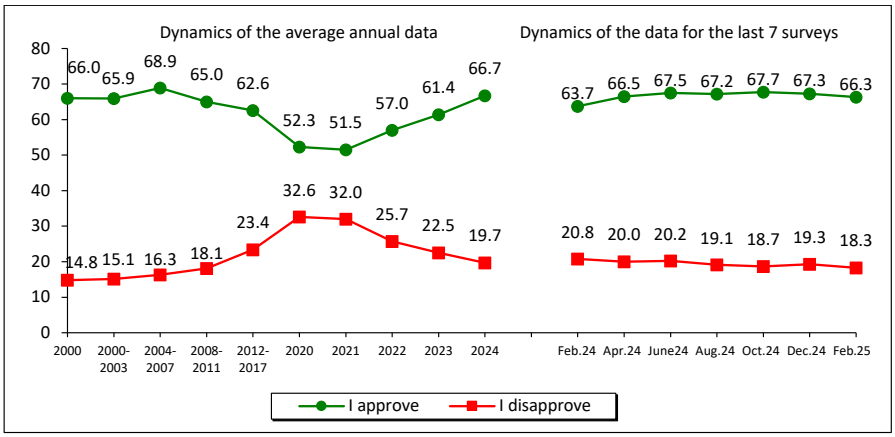
Positive changes are also observed with regard to the assessments of the performance of the Chairman of the RF Government (approval rating increased by 14 p.p., from 40 to 54%) and the Vologda Region Governor (by 15 p.p., from 37 to 52%).

How would you assess the current work of...? (% of respondents)

Response	Dynamics of the average annual data								Dynamics of the data for the last 7 surveys							Dynamics (+/-)		
																Feb. 2025		2024
	2000	2007	2012	2020	2021	2022	2023	2024	Feb. 2024	Apr. 2024	June 2024	Aug. 2024	Oct. 2024	Dec. 2024	Feb. 2025	Feb. 2024	Dec. 2024	2021
RF President																		
I approve	66.0	75.3	51.7	52.3	51.5	57.0	61.4	66.7	63.7	66.5	67.5	67.2	67.7	67.3	66.3	+3	-1	+15
I disapprove	14.8	11.5	32.6	32.6	32.0	25.7	22.5	19.7	20.8	20.0	20.2	19.1	18.7	19.3	18.3	–3	-1	-12
Chairman of the RF Government																		
I approve	-	-	49.6	38.7	39.9	45.4	50.1	54.1	52.7	53.7	53.5	55.3	53.7	55.6	54.7	+2	-1	+14
I disapprove	-	-	33.3	40.4	37.6	32.0	27.6	24.8	26.2	24.3	23.4	24.1	25.5	25.3	23.8	-2	-2	–13
Governor																		
I approve	56.1	55.8	41.9	35.0	36.7	40.9	48.1	51.7	50.8	51.7	51.6	53.4	51.9	50.8	46.8	-4	-4	+15
I disapprove	19.3	22.2	33.3	42.5	40.5	35.8	30.9	28.4	27.5	30.1	28.0	26.7	28.0	29.8	31.4	+4	+2	-12

Wording of the question: "How would you assess the current work of ...?"

How would you assess the way that the RF President is handling his job?
(% of respondents, VolRC RAS data)*



Response	Dynamics (+/-)		
	Feb. 2025		2024
	Feb. 2024	Dec. 2024	2021
I approve	+3	-1	+15
I disapprove	-3	-1	-12

* Here and elsewhere, all graphs show the average annual data for 2000, 2020, 2021, 2022, 2023, 2024, as well as the average annual data for the periods 2000–2003, 2004–2007, 2008–2011, 2012–2017 that correspond to presidential terms.

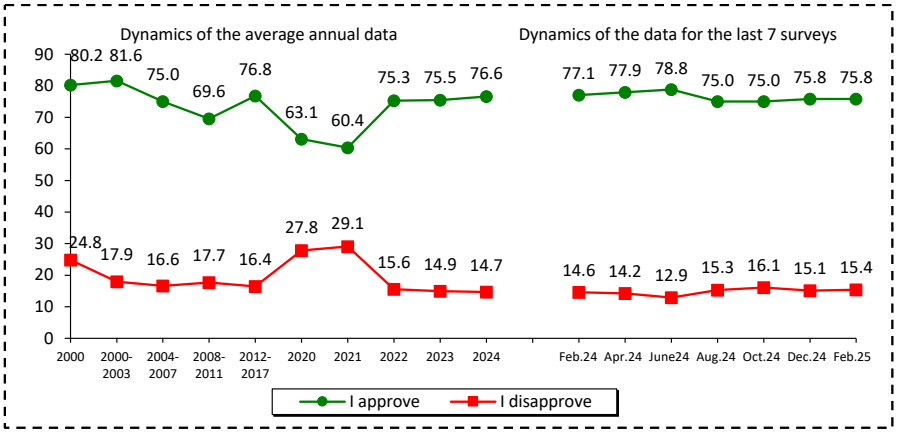
For reference:

According to VCIOM, the President's approval rating in December 2024 – February 2025 was 76%, the proportion of negative assessments was 16%.

People's estimates are generally consistent with the level of support for the work of the head of state in February 2024.

On average, in 2024 as compared to 2021, the RF President's approval rating increased by 16 p.p. (from 60 to 76%). The share of negative judgments decreased by 14 p.p. (from 29 to 15%).

Do you approve or disapprove of the way that the RF President is handling his job? (% of respondents; VCIOM data)



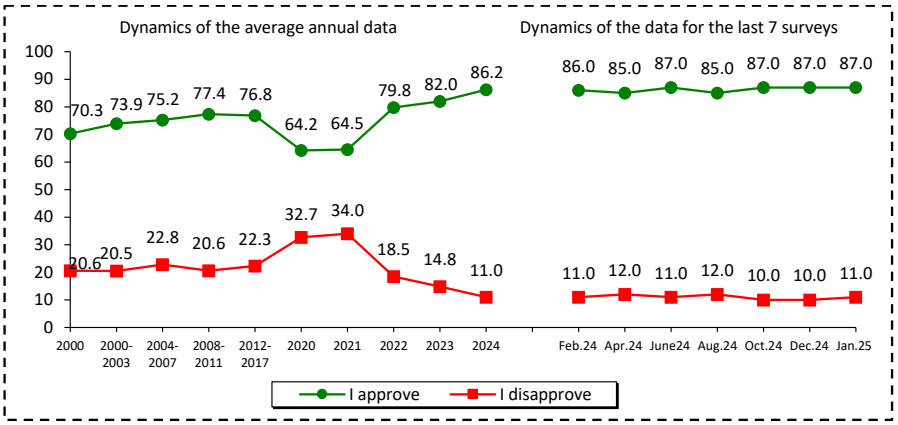
Response	Dynamics (+/-)		
	Feb. 2025		2024
	Feb. 2024	Dec. 2024	2021
I approve	-1	0	+16
I disapprove	+1	0	-14

Wording of the question: "In general, do you approve or disapprove of the way that the Russian President is handling his job?"
Data as of February 2025 reflect an average for two surveys: as of February 2, 2025 and February 9, 2025.
Source: VCIOM. Available at: https://wciom.ru/

According to Levada-Center, the share of positive assessments of the RF President's work in December 2024 – January 2025 amounted to 87%, and in general, the assessments have not changed significantly since February 2024.*

According to the annual average data for 2024 compared to 2021, the President's approval rating increased significantly, from 64 to 86% (by 22 p.p.). On the contrary, the share of those who disapprove of his activity decreased from 34 to 11% (by 23 p.p.).

In general, do you approve or disapprove of the way that Vladimir Putin is handling his job as President of Russia? (% of respondents; Levada-Center* data)



Response	Dynamics (+/-)		
	Jan. 2025		2024
	Feb. 2024	Dec. 2024	2021
I approve	+1	0	+22
I disapprove	0	+1	-23

Wording of the question: "In general, do you approve or disapprove of the way that Vladimir Putin is handling his job as President of Russia?"
Source: Levada-Center*. Available at: https://www.levada.ru/

* Included in the register of foreign agents.

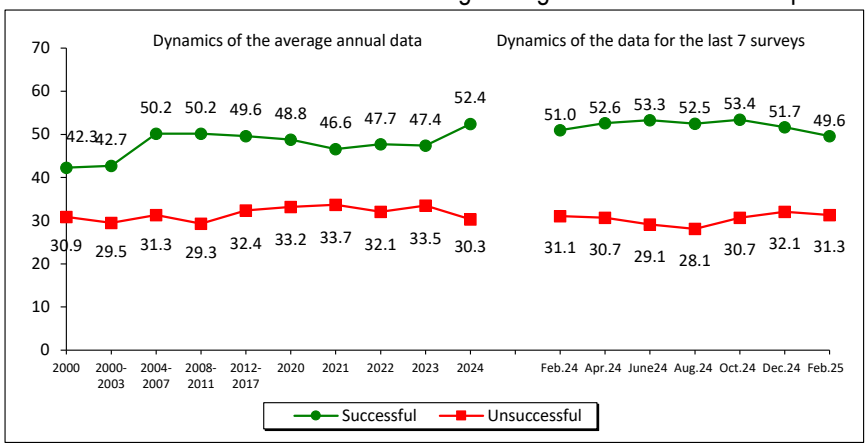
In your opinion, how successful is the RF President in handling challenging issues? (% of respondents; VolRC RAS data)

Over the past two months, the share of people who consider the actions of the head of state to strengthen Russia's international positions to be successful remained stable (50–52%). The share of those who hold the opposite point of view also did not change and amounted to 31–32%.

Over the past 12 months there were no significant shifts in the assessments of the region's population.

Compared to 2021 (the year preceding the start of the SMO), on average in 2024, the share of people who believe that the President's actions to strengthen Russia's international position are successful increased by 6 p.p. (from 46 to 52%). The share of those who hold the opposite viewpoint decreased by 4 p.p. (from 34 to 30%).

Strengthening Russia's international position



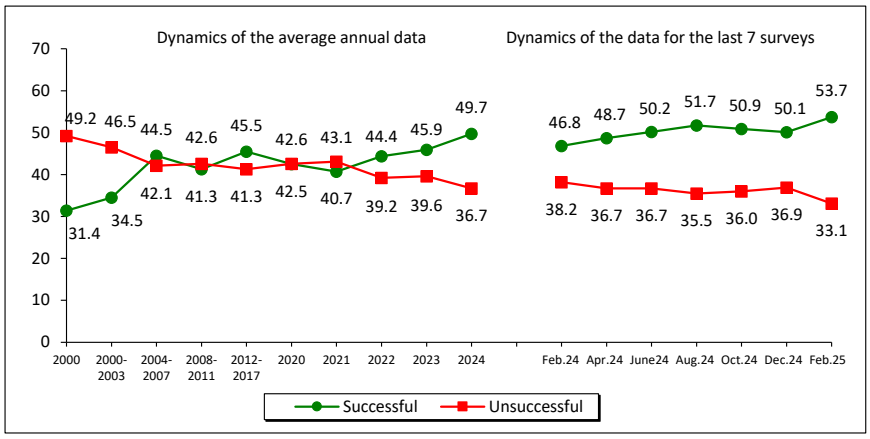
Response	Dynamics (+/-)		
	Feb. 2025		2024
	Feb. 2024	Dec. 2024	2021
Successful	-1	-2	+6
Unsuccessful	0	-1	-4

In February 2025 as compared to December 2024, the share of the Vologda Region residents who note the success of the RF President's actions to restore order in the country increased by 4 p.p. (from 50 to 54%). The share of negative judgments decreased from 37 to 33%.

Over the last 12 months, positive changes have been recorded: the level of approval of the head of state's work to restore order increased by 7 p.p. (from 47 to 54%), while the share of negative assessments decreased by 5 p.p.

From 2021 to 2024, the share of favorable assessments of the RF President's work to solve the problem of restoring order in the country increased by 9 p.p. (from 41 to 50%), while the proportion of negative assessments decreased by 6 p.p. (from 43 to 37%).

Imposing order in the country



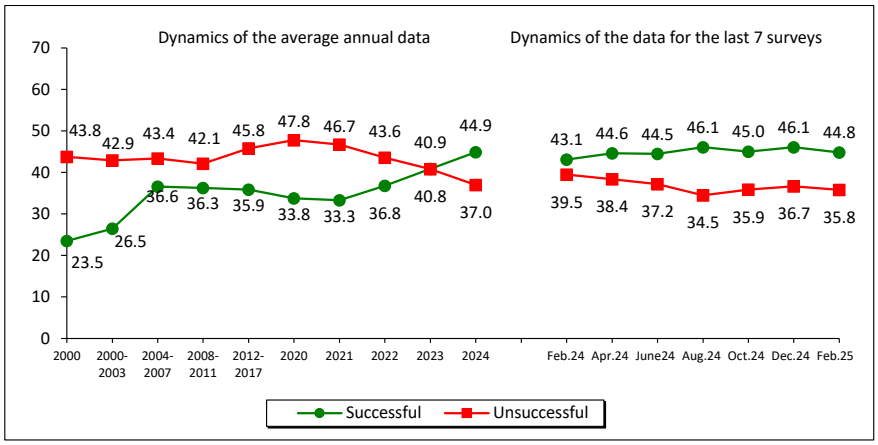
Response	Dynamics (+/-)		
	Feb. 2025		2024
	Feb. 2024	Dec. 2024	2021
Successful	+7	+4	+9
Unsuccessful	-5	-4	-6

In December 2024 – February 2025, the share of the Vologda Region residents who positively assess the activities of the RF President to protect democracy and strengthen the freedoms of citizens amounted to 45–46%; the share of opposite judgments was 36–37%.

Over the year of measurement, the share of negative assessments decreased by 4 p.p. (39 to 35%), the share of positive opinions remained unchanged.

On average, in 2024 as compared to 2021, the level of approval of the RF President's activities to protect democracy and strengthen freedoms of citizens increased by 12 p.p. (from 33 to 45%). The share of negative judgments decreased by 10 p.p. (from 47 to 37%).

Protecting democracy and strengthening citizens' freedoms



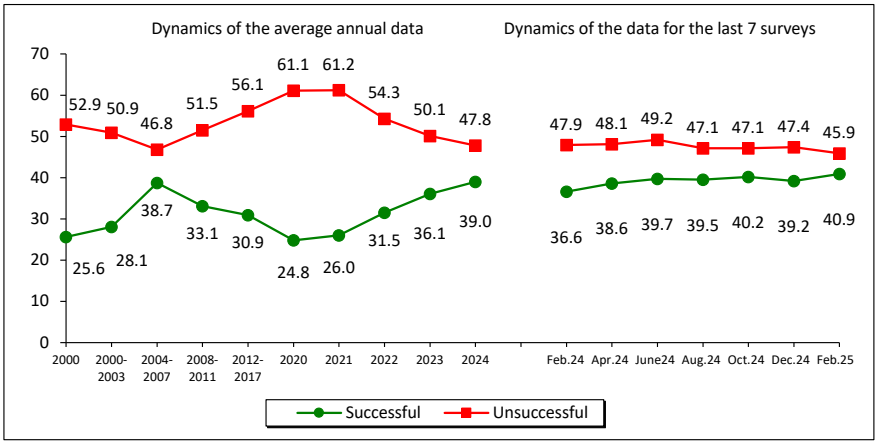
Response	Dynamics (+/-)		
	Feb. 2025		2024
	Feb. 2024	Dec. 2024	2021
Successful	+2	-1	+12
Unsuccessful	-4	-1	-10

The share of positive assessments of the RF President's efforts to solve the problems of economic recovery and growth of citizens' welfare over the last two months amounted to 40–41%.

In February 2024 – February 2025 the level of approval of the President's work to develop the economy and improve the financial situation of the population increased by 4 p.p. (from 37 to 41%).

After three years of the SMO, in 2024 compared to 2021, there is a significant increase in the proportion of positive assessments from 26 to 39% (by 13 p.p.) and a decrease in negative assessments from 61 to 48% (also by 13 p.p.).

Economic recovery, increase in citizens' welfare



Response	Dynamics (+/-)		
	Feb. 2025		2024
	Feb. 2024	Dec. 2024	2021
Successful	+4	+2	+13
Unsuccessful	-2	-2	-13

The political preferences of Vologda Region inhabitants over the past two months remained stable: the share of people whose interests are expressed by the United Russia party was 40–42%, the Communist Party – 9%, the Liberal Democratic Party – 8–9%, the Just Russia – 4%, the New People – 2%.

No significant changes in the population's assessments of political preferences were observed during the year of measurements.

On average, in 2024 as compared to 2021, there is a significant increase in the share of people who say that their interests are expressed by the United Russia party (by 11 p.p., from 32 to 43%), while the share of those who are skeptical about all parties represented in the State Duma has decreased (answer option "none"; a decrease of 9 p.p., from 34 to 25%).

Which party expresses your interests? (% of respondents; VoIRC RAS data)

Party	Dynamics of the average annual data												Dynamics of the data for the last 7 surveys							Dynamics (+/-)		
																				Feb. 2025		2024
	2000	2011	Election to the RF State Duma 2011, fact	2012	2016	Election to the RF State Duma 2016, fact	2020	Election to the RF State Duma 2020, fact	2021	2022	2023	2024	Feb. 2024	Apr. 2024	June 2024	Aug. 2024	Oct. 2024	Dec. 2024	Feb. 2025	Feb. 2024	Dec. 2024	2021
United Russia	18.5	31.1	33.4	29.1	35.4	38.0	31.5	49.8	31.7	35.2	39.5	42.9	42.7	44.5	43.7	42.5	41.8	42.3	39.9	-3	-2	+11
KPRF	11.5	10.3	16.8	10.6	8.3	14.2	8.4	18.9	9.3	10.1	9.6	8.9	9.0	8.5	8.2	9.7	8.7	9.1	8.8	0	0	0
LDPR	4.8	7.8	15.4	7.8	10.4	21.9	9.5	7.6	9.9	7.3	7.0	7.1	6.6	6.5	7.1	6.1	7.5	8.8	7.5	+1	-1	-3
Just Russia – Patriots for the Truth	-	5.6	27.2	6.6	4.2	10.8	4.7	7.5	4.7	4.9	4.4	3.5	3.6	2.8	2.7	3.5	4.2	4.4	3.1	-1	-1	-1
New People*	–	–	–	–	–	–	–	5.3	2.3	1.5	1.9	2.0	1.4	1.9	2.3	1.6	2.3	2.3	2.3	+1	0	0
Other	0.9	1.9	–	2.1	0.3	–	0.5	–	0.2	0.3	0.1	0.2	0.1	0.1	0.1	0.0	0.3	0.3	0.3	0	0	0
None	29.6	29.4	–	31.3	29.4	–	34.2	–	33.9	30.6	26.5	25.2	25.2	24.2	26.1	25.1	24.1	26.3	28.4	+3	+2	-9
Difficult to answer	20.3	13.2	–	11.7	12.0	–	11.1	–	10.0	10.1	11.1	10.3	11.4	11.4	9.8	11.5	11.0	6.5	9.7	-2	+3	0

* The New People party was elected to the State Duma of the Russian Federation for the first time following the results of the election held on September 17–19, 2021.

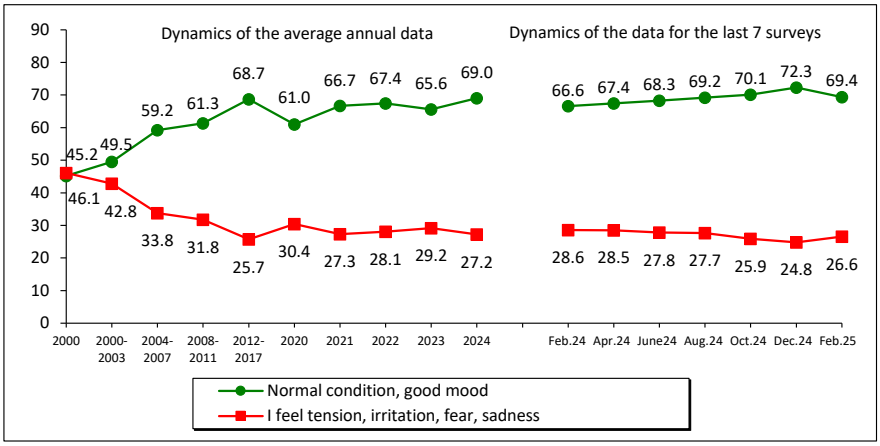
Estimation of social condition
(% of respondents; VolRC RAS data)

In December 2024 – February 2025, the share of the Vologda Region residents characterizing their mood as "normal, fine" slightly decreased (by 3 p.p., from 72 to 69%).

During the year of measurements, the population's assessments of their social mood slightly improved: the share of those who experience "normal, excellent mood" increased by 3 p.p., from 66 to 69%.

Compared to the year prior to the start of the SMO (2021), the assessment of social mood in 2024 has not changed significantly: the share of positive judgments is 67–69%, negative –27%.

Social mood



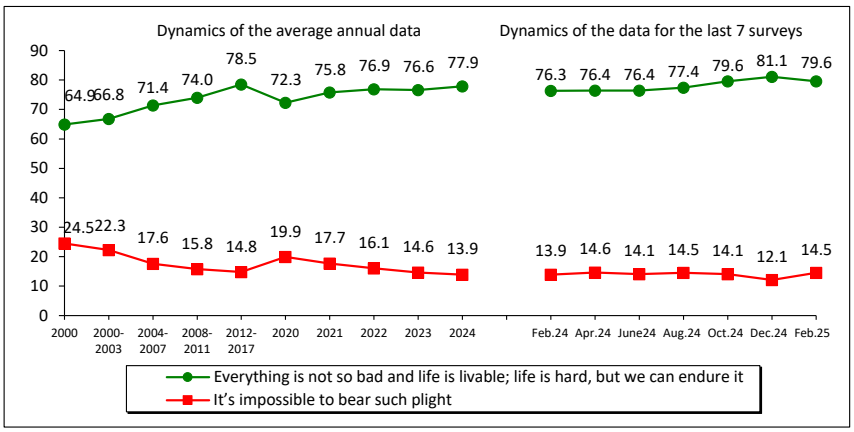
Response	Dynamics (+/-)		
	Feb. 2025		2024
	Feb. 2024	Dec. 2024	2021
Normal condition, good mood	+3	-3	+2
I feel tension, irritation, fear, sadness	-2	+2	0

There were no significant changes in the estimates of the stock of patience for the last two months: the share of positive judgments is 80–81%, negative – 12–14%.

In February 2024 – February 2025, the share of positive judgments increased by 3 p.p., from 76 to 79%.

In 2024, compared to 2021, the proportion of positive estimates of the stock of patience has not changed significantly (76–78%), while the share of negative characteristics slightly decreased (by 4 p.p., from 18 to 14 p.p.).

Stock of patience



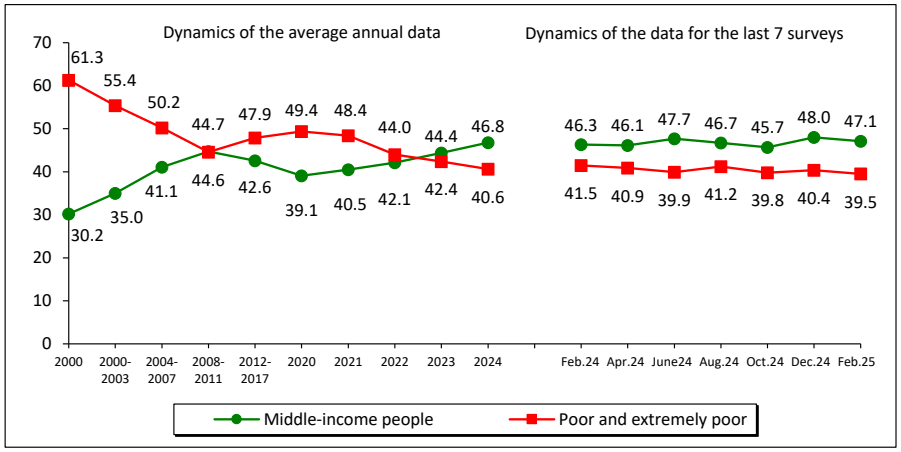
Response	Dynamics (+/-)		
	Feb. 2025		2024
	Feb. 2024	Dec. 2024	2021
Everything is not so bad and life is livable; life is hard, but we can endure it	+3	-2	+2
It's impossible to bear such plight	+1	+2	-4

As in December 2024, in February 2025, the share of Vologda Region residents subjectively classifying themselves as "middle-income" people was 47–48%. The proportion of the "poor and extremely poor" did not change as well (40%).

The values of social self-identification indicators have not changed over the last 12 months.

In the period from 2021 to 2024, there is a tendency toward improving subjective assessments of financial status: the share of those who consider themselves "middle income" people increased by 6 p.p. (from 41 to 47%); the share of those who consider themselves "poor and extremely poor" decreased by 7 p.p. (from 48 to 41%).

Social self-identification*



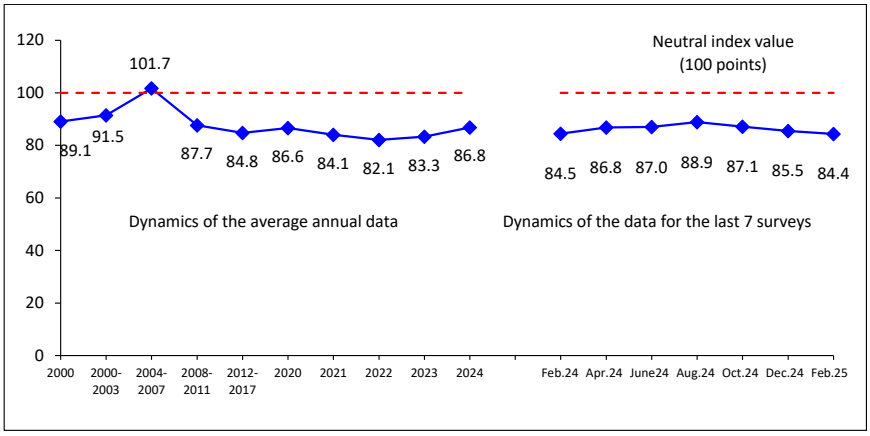
Response	Dynamics (+/-)		
	Feb. 2025		2024
	Feb. 2024	Dec. 2024	2021
Middle-income people	+1	-1	+6
Poor and extremely poor	-2	-1	-7

Wording of the question: "What category do you belong to, in your opinion?"

The Consumer Sentiment Index (CSI) in February 2025 remained at the same level as in December 2024 (84–85 p.).

In 2024, compared to 2021, the CSI increased by 3 points (from 84 to 87 p.), while positive dynamics of the average annual values of the CSI are observed from 2022 (from 82 to 87 p.).

Consumer Sentiment Index
(CSI, points; VolRC RAS data for the Vologda Region)



Response	Dynamics (+/-)		
	Feb. 2025		2024
	Feb. 2024	Dec. 2024	2021
Index value, points	0	-1	+3

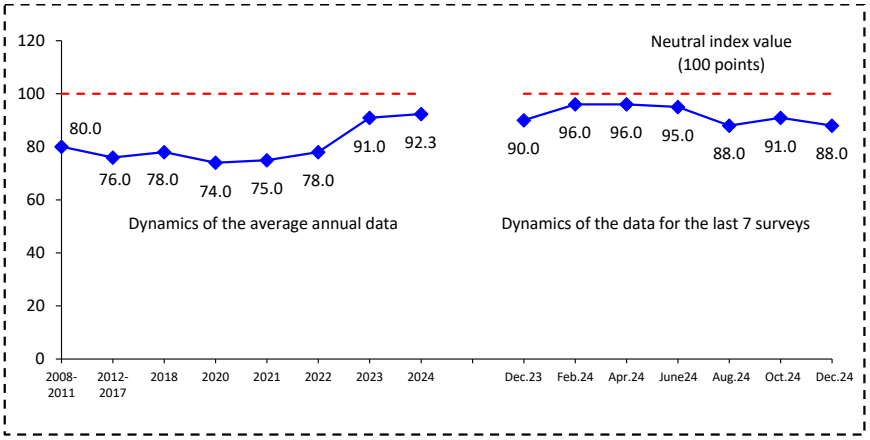
For reference:

According to the latest data from the all-Russian surveys by Levada-Center (for the period from October to December 2024), the Consumer Sentiment Index decreased from 91 to 88 points.*

There were no significant changes in the CSI for December 2024 through February 2025.

Tangible positive trends are recorded from 2021 to 2024: the CSI increased by 17 p.p., from 75 to 92%.

Consumer Sentiment Index (CSI, points; Levada-Center* data for Russia)



Response	Dynamics (+/-)		
	Dec. 2024		2024
	Feb. 2024	Oct. 2024	2021
Index value, points	-2	-3	+17

The index is calculated since 2008.

The latest data are as of December 2024.

Source: Levada-Center*. Available at: https://www.levada.ru/indikatory/sotsialno-ekonomicheskie-indikatory/

* Included in the register of foreign agents.

In the period from December 2024 to February 2025, an insignificant (by 3 p.p.) decrease in the share of people experiencing predominantly positive emotions in everyday life is observed in seven major socio-demographic groups. The share of positive assessments of social mood decreased more significantly among three groups: women – by 6 p.p., from 75 to 69%; persons with secondary vocational education – by 5 p.p., from 77 to 72%, and also in the group of the population, according to subjective self-assessments of income falling into the category of 60% of middle-income earners – by 4 p.p., from 74 to 70%. For two months, none of the groups has seen an increase in positive assessments.

Mood has improved in eight of the 14 social groups over the past 12 months. No negative changes have been recorded.

On average, in 2024, compared to 2021, preceding the start of the SMO, none of the main socio-demographic groups shows an appreciable decrease in the share of positive assessments of social mood.

At the same time, the increase in the share of positive judgments is recorded in women (by 4 p.p., from 67 to 71%); people with secondary vocational education (by 4 p.p., from 66 to 70%); as well as among the residents of Vologda (by 6 p.p., from 60 to 66%).

Social mood in different social groups (response: "Wonderful mood, normal, stable condition", % of respondents; VolRC RAS data)

Population group	Dynamics of the average annual data								Dynamics of the data for the last 7 surveys							Dynamics (+/-)		
																Feb. 2025		2024
	2000	2007	2012	2020	2021	2022	2023	2024	Feb. 2024	Apr. 2024	June 2024	Aug. 2024	Oct. 2024	Dec. 2024	Feb. 2025	Feb. 2024	Dec. 2024	2021
Gender																		
Men	50.1	65.9	69.1	60.8	65.7	66.8	65.5	66.5	66.5	67.7	63.5	67.1	65.2	69.2	70.1	+4	+1	+1
Women	43.3	61.7	65.8	61.2	67.4	67.9	65.7	70.9	66.5	67.1	72.1	70.9	74.0	74.7	68.8	+2	-6	+4
Age																		
Under 30	59.1	71.3	72.3	67.6	73.5	77.6	75.0	76.6	75.1	77.5	71.8	76.1	78.0	81.3	79.9	+5	-1	+3
30–55	44.2	64.8	67.9	61.8	69.5	69.4	68.8	71.3	69.9	70.0	71.8	72.8	69.8	73.2	70.2	0	-3	+2
Over 55	37.4	54.8	62.1	57.4	60.5	61.1	58.2	63.3	59.2	60.7	62.7	62.1	67.4	67.8	64.6	+5	-3	+3
Education																		
Secondary and incomplete secondary	41.7	58.4	57.2	56.1	62.1	64.6	62.0	64.6	63.9	64.7	65.5	65.3	62.5	65.5	64.6	+1	-1	+2
Secondary vocational	46.4	64.6	66.7	63.5	66.7	68.3	66.1	70.3	66.0	67.9	65.2	70.7	75.2	76.5	71.8	+6	-5	+4
Higher and incomplete higher	53.3	68.6	77.0	63.3	71.5	69.5	68.8	72.3	69.4	69.8	76.0	72.1	72.3	74.2	71.4	+2	-3	+1
Income group																		
Bottom 20%	28.4	51.6	51.5	43.4	54.6	57.0	50.1	53.5	52.2	53.0	51.3	53.7	54.8	55.7	55.9	+4	0	-1
Middle 60%	45.5	62.9	68.7	62.6	67.3	68.1	67.4	70.7	66.9	68.5	70.0	71.0	73.6	74.2	70.5	+4	-4	+3
Top 20%	64.6	74.9	81.1	75.6	79.9	78.3	73.9	77.6	74.4	77.5	78.5	75.9	78.4	80.6	77.9	+4	-3	-2
Territory																		
Vologda	49.2	63.1	73.6	60.9	60.3	59.8	59.6	66.0	62.5	64.2	65.2	66.4	67.9	69.6	66.7	+4	-3	+6
Cherepovets	50.8	68.1	76.2	60.4	71.0	71.2	68.1	69.8	67.2	68.2	69.4	70.2	70.7	73.0	69.9	+3	-3	-1
Districts	42.2	61.6	59.8	61.4	67.8	69.5	67.7	70.2	68.5	68.8	69.4	70.3	71.0	73.4	70.7	+2	-3	+2
Region	46.2	63.6	67.3	61.0	66.6	67.4	65.6	69.0	66.5	67.4	68.3	69.2	70.1	72.3	69.4	+3	-3	+2

SUMMING UP

As the results of the first round of the monitoring conducted in 2025 show, at the beginning of the year the estimates of the population remain generally stable. There were no significant changes in most key indicators compared to December 2024:

- ✓ **the President's approval rating remains at 66–67%;**
- ✓ **the ruling party (United Russia) retains its leading position with 40–42% support;**
- ✓ **the share of residents characterizing their mood as "normal, fine" is 69–72%;**
- ✓ **the stock of patience remained at a high level: 80–81% of respondents believe that "everything is not so bad and life is livable; life is hard, but we can endure it";**
- ✓ **the share of the Vologda Region residents subjectively categorizing themselves as middle-income people is in the range of 47–48%;**
- ✓ **the Consumer Sentiment Index has not changed significantly and is 84–85 p.**

A significant improvement in the assessments of public opinion over the three years of the special military operation is noteworthy. Moreover, positive trends can be traced practically for all the main monitoring indicators, except for assessments of social mood (which is quite obvious, given the continuing high level of threats to national security). However, the absence of negative changes and the preservation of a stable level of people's self-assessments of their psychological state against this background, in our opinion, should also be interpreted from a positive point of view.

On average over 2024 compared to 2021 prior to the start of the SMO:

- ✓ **the level of approval of the activity of all analyzed authorities (the President, the Government, the head of the region) increased by 14–15 p.p.; the share of people who believe that their interests are expressed by the United Russia party increased by 11 p.p.;**
- ✓ **the highest level over the entire period of measurement was reached by the assessment of the President's success in solving the key problems of the country: strengthening Russia's international positions (52%), restoring order (50%), protecting democracy and strengthening freedoms of citizens (45%), boosting the economy and increasing the welfare of the population (39%);**
- ✓ **noticeable positive changes are observed in the dynamics of people's assessment of their financial situation and forecasts of its development: the share of the "poor and extremely poor" decreased by 7 p.p. (from 48 to 41%); the share of "middle income" people increased by 6 p.p. (from 41% to 47%); the Consumer Sentiment Index continues to increase annually from 2022 (by 5 points, from 82 to 87% over this period).**

It is important to emphasize that for almost all of the above-mentioned indicators the population's assessments reached the highest level for the entire period of measurements, and it is obvious that we are talking about the influence of at least two factors: first, the active daily activity of all government bodies in making managerial decisions regulating life in the country, aimed, among other things, at socio-economic support of the general population and individual categories of citizens. Second, the psychological consolidation of Russian society around the president and the patriotic public agenda declared by the state against the background of unrelenting threats to national security from the Collective West.

In a sense, the president himself spoke about this psychological consolidation of Russian society during his "direct line" in 2024:

A. Suvorova (moderator): "*In recent time, everyone has been feeling a disturbing sense that the world is going crazy, or already has, because the potential for conflict is off the charts in every part of the world, and the global economy is struggling.* ***How does Russia manage not only to stay afloat, but also to continue growing in this situation?"***

V. Putin: "*You know, when all is calm and life is measured and stable, we get bored. This amounts to stagnation, so we crave action...* ***I previously spoke about our economic growth – this is largely attributable to the reinforcement of sovereignty,*** *which extends to the economic realm. Many foreign manufacturers have exited our market. What has been the consequence? Our entrepreneurs have started producing these goods domestically, necessitating further research and the engagement of institutions, including those focused on development. All of this – what we are discussing – is the enhancement of technological sovereignty.*

Sovereignty manifests itself in various forms: defense, technology, science, education, culture. This is of paramount importance, especially for our nation, because should we lose sovereignty, we risk losing statehood"[3]**.**

Thus, public opinion in the region demonstrates stability and improvement by many indicators in the long-term dynamics. This is due to the unification of society in the face of external threats, as well as the positive perception of the authorities' efforts to protect national sovereignty and improve the economic situation. As noted by RAS Academician M.K. Gorshkov: "*It should be clearly stated: there is no catastrophism in the public consciousness of Russians. They are optimistic about the future, only 4% of respondents admit a negative scenario. Optimism is based not on abstractions, but on understanding and support of national development plans*"[4]. Thus, we can state that in the current dynamics the population demonstrates a high level of adaptation to the new realities.

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[3] "Results of the year" with Vladimir Putin, December 19, 2024. Available at: http://www.kremlin.ru/events/president/transcripts/75909

[4] People want to see a strong and honest country. Interview with M.K. Gorshkov, RAS Academician, Scientific Director of FCTAS RAS, Director of the Institute of Sociology FCTAS RAS, February 20, 2025. Available at: https://lgz.ru/article/lyudi-khotyat-videt-stranu-silnoy-i-chestnoy/?ysclid=m74q7wzbq6119739908

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