ECONOMIC AND SOCIAL CHANGES:

FACTS, TRENDS, FORECAST

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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), which existed as Vologda Scientific Coordinating Center of Central Economic and Mathematical Institute of RAS until March 2009, is situated on the territory of the Vologda Oblast. V.A. Ilyin, Doctor of Economics, Professor, Honored Scientist of Russia, is the permanent director of the Institute. A lot of great scientists have played an important role in the formation and the development of ISEDT RAS as a scientific institution such as: academicians D.S. Lvov, V.L. Makarov, V.I. Mayevsky, A.D. Nekipelov, Y.S. Osipov. Everything that has been done before and is being done nowadays by the personnel of the Institute, it would be impossible without the constant support of the Vologda Oblast's Government and city leaders.

The formation of the scientific personnel with an active life position, a great demand for Institute's investigation, academic community's support of the new journal published by ISEDT RAS, which combined efforts of the economic institutes of RAS in the Northwestern Federal District, and furthermore development of international ties have become the main outcomes of the last years.

MAIN RESEARCH DIRECTIONS

Due to the Resolution № 96 by the Presidium of Russian Academy of Sciences dated from March 31, 2009 VolRC RAS carries out investigations 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.

INTERNATIONAL TIES AND PROJECTS

In order to integrate scientific activities of the Institute's scholars into global research area, international scientific conferences are held on a regular basis; they result in cooperation agreements with different scientific establishments:

2007 – Cooperation agreement is signed with 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 Institute of Economics of the National Academy of Sciences of Belarus (Minsk, 2010).

2011 – Cooperation agreements are signed with National Institute of Oriental Languages and Civilizations (Paris, 2011), Institute of Business Economy at Eszterhazy Karoly College (Hungary, 2011), Republican research and production unitary enterprise "Energy Institute of NAS" (Belarus, 2011). Protocol of intentions 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 – Cooperation agreement 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 agreements are signed with Jiangxi Academy of Social Sciences (China, 2014), National Academy of Sciences SM TsSaiSI (Belarus, 2014). Protocols of intent are signed with the Academy of Social Sciences Jiangxi Mao Zhiyong (China, 2014), National Institute of Languages and Civilizations (France, Jean Verkey, 2014).

2015 – Protocol of intent is signed with the Academy of Social Sciences, Jiangxi Province (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 EHESS Ecole des Hautes Etudes en Sciences Sociales (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). Protocols of intentions are signed with Academy of Social Sciences in province Jiangxi (China, 2016).

CONTENT

BRANCH-WISE ECONOMY

LABOR ECONOMICS

SOCIAL DEVELOPMENT

HISTORY OF ECONOMIC AND SOCIOLOGICAL THOUGHT

DISCUSSION PLATFORM

PUBLIC OPINION MONITORING

PUBLIC ADMINISTRATION EFFICIENCY

Editorial

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Civil Society and the Transit of Power in 2024

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Abstract. The article deals with the issue of the transit of power in 2024 and the role of civil society in addressing key tasks that the head of state has to deal with in the period before the election to the State Duma of the Russian Federation (2021) and the presidential election (2024). We investigate historical aspects of the transit of power in Russia that show the broad and complex scale of its implications for social development. We provide forecasts and expert assessments of the current situation in the country as a factor in the possible success of the transit of power in 2024. On the basis of the data of the all-Russian and regional sociological studies implemented in the form of a monitoring we analyze the dynamics of public opinion on key issues related to public and personal needs that are actual and expected to be implemented. The analysis reveals that the most acute problems of concern to the population are long-term and unresolved. On the background of the launch (unsuccessful in many ways) of national projects 2018 and worrying forecasts about the prospects for the future of Russia, and given the fact that Russia's economy has overcome the period of stagnation observed since 2014, this brings to the fore the issue

concerning the effectiveness of public administration in the new political cycle in which (according to the Constitution of the Russian Federation) Vladimir Putin will not be able to take the post of head of state. In the "transit" period (the period remaining until the State Duma election of 2021 and the presidential election of 2024), the President has to deal with the tasks of a higher level. One of them is related to the implementation of the potential of civil society accumulated over the past 20 years, since civil society is an active entity representing the interests of the general population in dialogue with the authorities at all levels of government. The solution to this problem can guarantee a successful "transit" of the Russian society in a new historical period.

Key words: transit of power, President, civil society, justice, inequality, public administration efficiency.

Since the beginning of Vladimir Putin's fourth presidential term, the expert community has been paying increasing attention to the issue of the transit of power in 2024 and the future of the state administration system and the country as a whole after Vladimir Putin, in accordance with the current Constitution of the Russian Federation, will not be able to run for the post of head of state again.

> **The key task of reducing socio-political risks is the predominant influence of the "responsible class" on the formation of the national agenda.** The position of the elites – the main leaders who have the ability to influence policy – is important here. Hence the task of nationalizing the elites, consolidating them, and expanding their social and political horizons... **But no less important is the consolidation of "sub-elite" groups that do not have direct authority, do not have a certain social status, and are characterized by the ability to analyze the situation rationally and responsibly.** Their opinions and positions are usually significant for the elites and influence their decisions... Strong support for changes by "sub-elite groups" greatly reduces the likelihood that the inevitable temporary discontent and unrest in local environments will turn into serious socio-political risks[1].

"The topic of the so-called transit or transfer of presidential power occupies the main place in analytical articles of domestic and foreign media"[2]. The issues related to the readiness of the Russian political and economic system for a new period for the country are being discussed; the tactics to be followed by the party in power during the electoral cycle are predicted; scenarios are analyzed regarding the prospects for interaction between the state and society. Considerable attention is paid to the values of the current elite, which directly affects the political situation in the country, and the activity of "sub-elite groups" − responsible initiative citizens who can influence management decisions made by the authorities.

Many experts emphasize that the transit of power will take place not after the 2024 presidential election, but much earlier − in 2021, when the election to the State Duma will take place in Russia. Since there is very little time left before this event, this circumstance further "warms up" discussions about future changes that may occur in the system of public administration and in the political and economic life of the country.

The relevance of this topic raises no doubts. As the historical experience of Russia shows, **the transit of power is a phenomenon that goes far beyond the system of state administration and**

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[1] Russian breakthrough and the challenges of civil society: a special report prepared on the basis of the decision of the Civic Chamber of the Russian Federation dated 08.04.2019. Moscow: Sovr-e inf-e sist., 2019. 60 p. *Official website of the Civic Chamber of the Russian Federation*. Available at: https://www.oprf.ru/press/news/2019/newsitem/51383.

[2] Vanin G. After Putin: the future transit of power in Russia. Available at: https://regnum.ru/news/polit/2756069.html

V. Solovey: "The transit of the system should be carried out before 2024, in order to catch foreign and domestic enemies by surprise. The years 2020 – 2021 may be decisive"[3].

A. Stepanov: "...under any scenario, one thing is clear – the upcoming 2021 election to the Russian State Duma are of key importance on the political agenda. Because they should guarantee the stability of the country's development, which is the basic guarantee of the implementation of any transit scenario"[4].

M. Khazin: "The topic of the transit of power in the past six months has become dominant in the socio-political discourse... In fact, all political forces (or those claiming political status) have started a game to prepare their positions for this very transit. And it is still unknown when it will happen"[5].

V. Fadeev: "The 2021 parliamentary election is very important for organizing normal transit in 2024"[6].

political structure; it concerns society as a whole. The transit of power in 1917 actually led to the complete destruction of the foundations of the Russian Empire. The periods of rule of each of the subsequent leaders of the country received in history such definitions as "Lenin's NEP", "Stalin's winter", "Khrushchev's thaw", "Brezhnev's stagnation", which fully reflects the fundamental essence of the transition of power – complex changes not only of the political system, but also of the basic foundations of society.

The transit of power under Gorbachev led to the collapse of the USSR in 1991, Russia's transition to a market economy, and a change in the social order (with all the consequences for society). The transit of power in 2000 led to the end of the era of anarchy of the 1990s and the advent of the value of stability as a "common ground" between the implemented government policy and the prevailing need of the wider population. With the beginning of V. Putin's presidential terms Russia started to organize the power vertical, overcome negative trends in the economy, address acute problems on the external borders of the country, and all this has had a positive impact on the overall psychological state of society, and its attitude toward the state.

We remember the history of the collapse of the USSR, which, of course, was prepared by the "Gorbachev team", but was not completed by the "Yeltsin team". **And our country will not survive another such transit.** The trouble is that you cannot explain this to power groups, they are fighting for power, and they simply do not see everything else, even when all their members are real patriots[7].

Both of the above events in modern Russian history (the transit of power in 1991 and 2000) are united by two factors.

First, in both cases, a specific political process (the change of the national leader, the top-level management team, and the political course) was preceded by certain moods that dominated society. They consisted in a clear, growing dissatisfaction with the state of affairs in the country, in making claims against the ruling elite about its inability to meet the most acute, primary needs of citizens, and in the accumulation of a critical mass of public discontent.

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[3] Solovey V. The transit of the system should be implemented before 2024. Available at: https://echo.msk.ru/blog/vsolovej/2293254-echo/

[4] Stepanov A. The transit of power and the State Duma election. Will the current political system stand the most important test? Available at: https://ruskline.ru/news_rl/2019/10/19/tranzit_vlasti_i_vybory_v_gosdumu

[5] Khazin M. A new transit of power has begun in Russia. Available at: http://zavtra.ru/blogs/v_rossii_nachalsya_novij_tranzit_vlasti

[6] Gurova T., Skorobogatyi P. People are too independent to be bought for a grant (interview with V.V. Fadeev, Chairman of the Civic Chamber of the Russian Federation). *Ekspert*, 2019, no. 1–3, p. 59.

[7] Khazin M. A new transit of power has begun in Russia. Available at: http://zavtra.ru/blogs/v_rossii_nachalsya_novij_tranzit_vlasti

Second, after the change of the leadership the country experienced the changes in "reference points" that form the basis of consensus between the needs of society and the obligations of the state; those reference points ensured the legitimacy of the new management team and the political course it implements in people's assessments and, simultaneously, served as the main criterion for their effectiveness. Thus, after the collapse of the Soviet Union, state policy and the values of society largely found common ground in liberal ideas: citizens' freedoms, the abundance of goods in stores, the expansion of opportunities for individual success, etc., that is, in all that was lacking for ordinary people in the Soviet period. However, the realization of the fallacy of weakening the role of the state, as well as the overall development vector that the country was moving along in the period of the 1990s, led to the fact that society and government required strong and effective state management focused on the implementation of national interests in all spheres of life.

The transit of power in 2024, in fact, has the same characteristics as the mentioned changes in the system of public administration in 1991 and 2000. Today, despite the more constructive attitude of society toward the government (in comparison with public attitudes during the "decline" and the first decade after the collapse of the USSR), there is also growing dissatisfaction with the stagnation of the economy and the unresolved most acute issues that people face in their daily lives. So, over the past three years (2017–2019), the relevance of people's perception of the problem of low living standards has actually returned to the period of the late 1990s (1998–1999): in 1999, 57% of the region's residents called the problem of poverty the most acute for the country, in 2005 – 29%, in 2011 – 49%, and in 2019 – 56% *(Insert 1)*.

No less disturbing are the dynamics of income inequality in Russian society: if in 1998–1999 the stratification of the population into "poor" and "rich" as the most acute problem for the country was noted by 22% of people, by 2005 their share had increased to 29%, and since 2010 the share of those who share this opinion did not fall below 34%; *Insert 1*).

As a result, the need for social justice is growing in all strata of Russian society. Over almost three years that have passed (from February 2016 to December 2019), the share of people who believe that modern Russian society is unfairly organized has increased by 10–20 percentage points in all major socio-demographic groups, including high-income groups (from 36 to 57%) and people with higher education (from 42 to 63%; *Insert 2*). According to the results of Russian nationwide sociological measurements, currently 72% of citizens "do not see that the interests of the government and society coincide"[8], and the share of Russians who believe that "the Constitution should be revised today" is growing (in 2003 – 47%, in 2007 – 51%, in 2019 – 68%)[9].

The dynamics of public opinion assessments, which are monitored by Russia's major sociological centers, correlates with the results of research conducted by foreign companies. In particular, this applies to the most pressing issues – low living standards and high income inequality.

Thus, according to the annual report of the Swiss company Credit Suisse, "in the world as a whole, global wealth over the past ten years,

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[8] Society and the state: press release from 28.11.2019. Levada-Center. Available at: https://www.levada.ru/2019/11/28/obshhestvo-i-gosudarstvo/

[9] About the Constitution. Attitude to the main law of the country and to the possibilities of its revision: press release from 09.12.2019. Public Opinion Foundation. Available at: https://fom.ru/Bezopasnost-i-pravo/14307; Public Opinion Foundation database. Available at: https://bd.fom.ru/report/cat/power/pow_con/d074926

Insert 1

Dynamics of the most pressing issues of concern to the population (% of respondents)
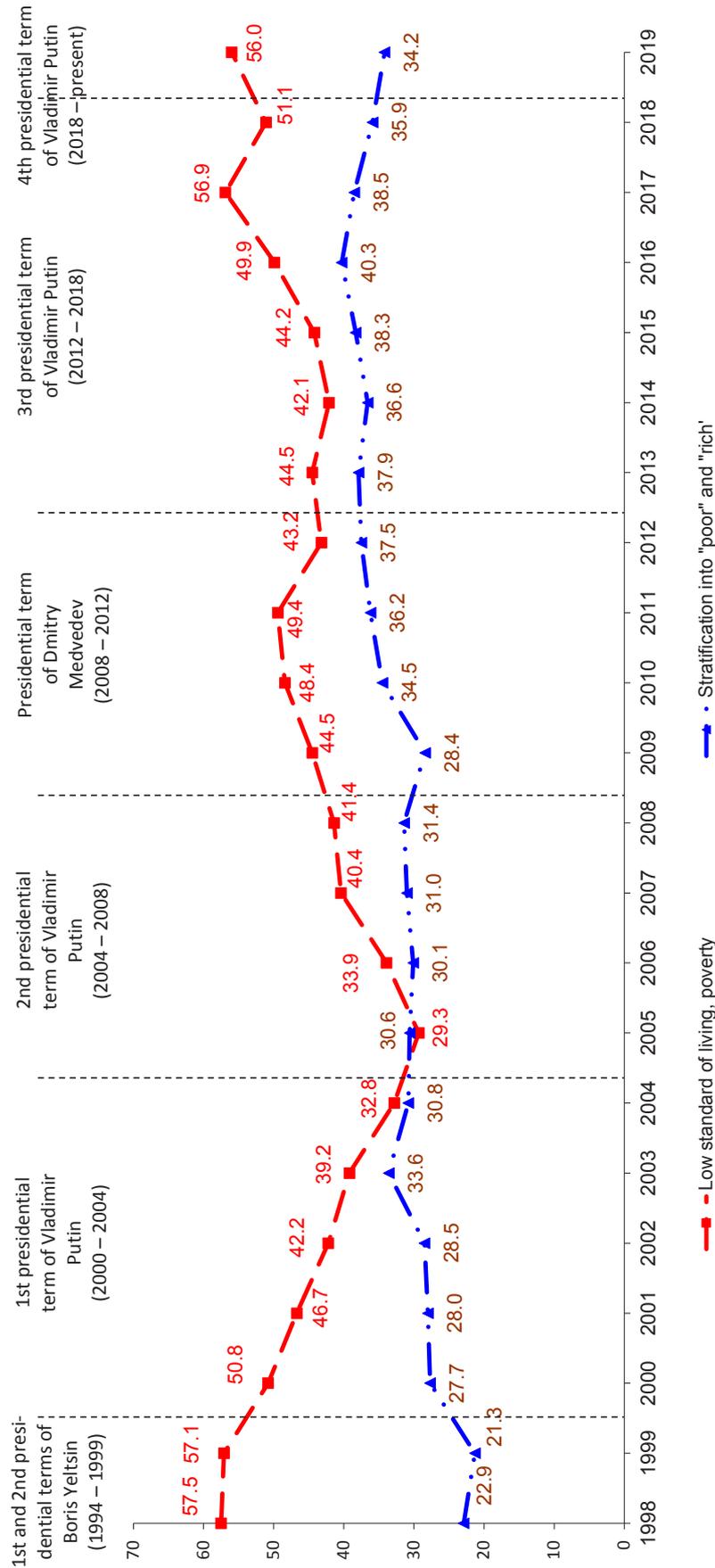
Throughout the period from 1998 to 2019, the low standard of living and the stratification of the population into "poor" and "rich" were among the top five problems that people consider the most acute for the country.

Over the period from 2000 to 2019, the share of residents concerned about poverty increased by 5 percentage points (from 51 to 56%) and **in fact, it returned to the period of 1998-1999.** The relevance of the perception of income inequality has decreased slightly over the past 4 years (2016–2019) (from 40 to 34%); however, **in the general context of social changes that occurred during Vladimir Putin's presidential term, we should note its increasing dynamics:** in 2000 – 28%, in 2005 – 29%, in 2019 – 34%.

Insert 2

Proportion of those who believe that modern Russian society is organized unfairly (% of respondents)*

Population group	Feb.16	Feb.19	Dec.19	Dynamics + / – December 2019 to February 2016
Sex				
Men	42.3	58.3	61.3	+19
Women	43.6	59.3	58.3	+15
Age				
Under 30	46.5	59.6	56.5	+10
30-55	42.7	57.7	60.0	+17
Over 55	41.8	60.0	60.3	+19
Education				
Secondary and incomplete secondary	46.4	64.0	57.7	+11
Secondary vocational	41.3	56.7	57.9	+17
Higher and incomplete higher	41.8	56.7	63.4	+22
Income groups				
Bottom 20%	43.8	63.0	50.9	+7
Middle 60%	46.0	58.8	63.8	+18
Top 20%	35.5	58.3	57.0	+22
Territories				
Vologda	43.3	66.0	60.8	+18
Cherepovets	51.1	66.3	73.6	+23
Districts	38.0	50.4	50.9	+13
Oblast	43.0	58.9	59.6	+17

* The wording of the question is: "Do you think modern Russian society as a whole is organized fairly or unfairly?" (variant of the answer "Unfairly").

The question was first asked in February 2016. Over the next 4 years (February 2016 – December 2019), the share of people who believe that modern Russian society is unfairly organized increased **by 15–20 percentage points in all socio-demographic groups** and especially among the relatively rich (from 36 to 57%) and highly educated (from 42 to 63%), which suggests that **the growing severity of social life organization is perceived especially acutely by not only the socially vulnerable categories of the population (low-income groups, pensioners), but also those people who are potentially more interested in political life and the state of affairs in Russia.**

by mid-2019, has increased by 70%, to 70,850 USD per adult. The median wealth level in 2019 was 7,087 USD (that is, the level of wealth of half of the world's adult population is above this level, and half − below it). **In Russia, the average figure is about 27,000 USD per adult, the median level is 3,683 USD.**

The leading positions in the geographical distribution of wealth belong to the United States (its share of world wealth is 29.4%), China (17.7%) and Japan (6.9%). **In Russia, for comparison, the share of world wealth is 0.8%.** And yet, as the researchers note, "**at a modest level of general welfare, 10% of the wealthiest Russians have 83% of the country's wealth. This is more than in the U.S. (76%) and China (60%)**"[10]**.**

It is important to note that long-term increasing need to find a solution to these issues leads to the emergence of fundamentally new processes in the public consciousness − as life in Russia is moving away from the numerous perturbations of the "turbulent" 1990s, the need for stability is becoming less popular and makes room for awareness of the need for change, which, apparently, **will become the dominant trend of social consciousness in the coming years.** According to Russian research, over the past five years (from 2014 to 2018), the share of supporters of change in Russia's life has increased almost twofold (from 30 to 56%) and today it comprises the majority of Russians. The opposite view ("stability is more important than change") was shared by 70% of Russians in 2014 and by 44% in 2018%[11]. According to the data of a monitoring conducted by VolRC

RAS on the territory of the Vologda Oblast[12], the share of supporters of change also prevails over the share of adherents of stability **in all socio-demographic groups**, while over the past year it has increased (albeit slightly) in most social strata (in 12 out of 14; *Insert 3*).

Thus, **everything points to the fact that today Russia is on the threshold of changes that go far beyond the "cosmetic" changes in the system of public administration**; perhaps, on the threshold of changes of a level that "Putin's" Russia has not yet known. We should note that the above two transits of power (in 1991 and in 2000) ended up in a completely opposite way: with the sign "−" and the sign "+" and a crucial role in this sense was played by concrete persons at the helm − Boris Yeltsin, under whom the so-called "oligarchic capitalism" emerged in the Russian system of government, and Vladimir Putin, who managed to overcome the political and economic crisis inside the country and began restoring its geopolitical status in the international arena.

It is not yet known what state the public administration system will be in in the next political cycle. According to some experts, "the actual state of the upper echelon of the elite is highly likely to determine the arrival of new people after Putin to run the country from another, lower level of power. And this, in conditions of an extremely small radius of trust in Russian society, means an automatic **radical**

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[10] All the wealth of the world. *Ekons.*, 2019, 25 Oct. Available at: https://econs.online/articles/photo/snegokhod-batut-dzhakuzi-kak-domashnie-innovatsii-sposobstvyut-progressy/

[11] Petukhov V.V. Dynamics of social moods of Russians and the formation of a request for change. *Sotsis*, 2018, no. 11, p. 42.

[12] VolRC RAS public opinion monitoring is held six times a year in Vologda, Cherepovets, and in eight districts of the Oblast (Babayevsky District, Velikoustyugsky District, Vozhegodsky District, Gryazovetsky District, Kirillovsky District, Nikolsky District, Tarnogsky District and Sheksninsky 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 Oblast's adult population. Sampling error does not exceed 3%.

change of the elite that makes key decisions in the state, a break in gradualness"[13].

However, it is quite obvious that after 2024, the head of state will face tasks that are no less ambitious and fateful for the Russian state. This applies to both internal and external challenges. V. Putin prepared the ground for further development: an ordered vertical of power (although it does not always work efficiently and many of the questions require personal intervention of the President), outlined the contours of civil society (its organizational forms, purposes, scope of authority), strengthened the geopolitical status of Russia, overcame the acute phases in the demographic and economic crisis, returned the people's confidence in government (to date, the level of trust in Vladimir Putin is 52%, it is **two times more** than the trust in Boris Yeltsin in 1996; *Insert 4*)... all this shows that a lot has been done against the background of the condition of the country when Vladimir Putin "took" it from the first President of the Russian Federation, Boris Yeltsin.

> We have not just tripled the bureaucracy in comparison with the USSR. **This is not the Imperial bureaucracy, which was responsible for the result with its head, it is the service staff, which (from some level) knows perfectly well what kind of oligarch it works for, and which categorically does not want to answer for anything (except for its obligations to the oligarch).** This is very clear from the results of the so-called national projects, the main task of which is to transfer budget money to oligarchs and withdraw it from the country (the Ministry of Finance and the Central Bank are responsible for this). Accordingly, the level of corruption is appropriate, since the service staff should have their share[14].

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[13] Remchukov K. Analysis of the most likely scenarios for Russia's development in the coming years. Available at: https://echo.msk.ru/blog/statya/2540439-echo/

[14] Khazin M. on the social structure of comprador capitalism. Available at: http://zavtra.ru/blogs/o_sotcial_noj_strukture_kompradorskogo_kapitalizma

Finding a solution to these tasks, of course, on a historical scale, required specific personal characteristics from the national leader. We recall that throughout his presidential terms, Vladimir Putin had to act in conditions of both external pressure from "foreign partners" and in the conditions of a wide representation of liberal-minded elites within the country, who have held key positions in the system of public administration since the time of B. Yeltsin, have close financial and personal ties with domestic and foreign big business, and who at one time (in 1999) supported Vladimir Putin's candidacy for the post of President of the Russian Federation.

Under the current conditions, achieving the success that can be safely attributed to the President today would be impossible without using the so-called "hands-on" approach. And although the key problems of governance are traced in the very consequences of its use, we should note that without such a regime the head of state would have failed to prevent the collapse of the country, "restrain" the oligarchs in the early 2000s, and achieve a stable high level of confidence compared to all existing state and non-governmental institutions (this is not explained solely by the traditional, socio-cultural factor because trust in President Yeltsin in 1996, according to opinion polls, was lower than trust in the Church and the Army; *Insert 4*).

We should also note that during his presidency V. Putin significantly increased the material prosperity of **all income groups**, including the 20% of least wealthy citi*zens (Insert 5)*, and the share of people complaining that "it is impossible to bear such plight" decreased significantly **in all socio-demographic groups**, regardless of gender, age, area of residence, level of education and income *(Insert 6)*.

Insert 3

Would you like to see changes in the life of the country?*

Answer	The country needs stability, this is more important than change			The country needs significant changes; new reforms in the economic and political life of the country are necessasry		
	2018	2019	Dynamics +/–	2018	2019	Dynamics +/–
Sex						
Men	39.8	34.2	-6	41.6	43.6	+2
Women	40.1	36.2	-4	40.3	43.6	+3
Age						
Under 30	34.3	29.0	-5	42.0	43.7	+2
30-55	39.2	33.8	-5	41.7	45.4	+4
Over 55	43.9	40.0	-4	39.3	41.3	+2
Education						
Secondary and incomplete secondary	37.3	30.5	-7	39.3	45.4	+6
Secondary vocational	41.6	39.1	-3	41.5	42.8	+1
Higher and incomplete higher	40.8	35.5	-5	41.9	42.5	+1
Income groups						
Bottom 20%	29.3	30.0	+1	40.7	44.2	+4
Middle 60%	42.6	36.7	-6	40.9	45.1	+4
Top 20%	44.5	40.1	-4	39.6	39.5	0
Territories						
Vologda	32.2	31.3	-1	47.4	46.2	-1
Cherepovets	40.6	32.6	-8	48.2	49.5	+1
Districts	44.1	39.2	-5	33.0	38.6	+6
Oblast	40.0	35.3	-5	40.9	43.6	+3

* In 2018, the question was asked three times: in February, June, and October. The data for the same months of 2019 are presented as the average for 2019.

Over the period from 2018 to 2019, the share of supporters of changes in Russia's life increased in 12 of the 14 socio-demographic groups, especially among people with secondary and incomplete secondary education (by 6 percentage points, from 39 to 45%), as well as in the districts of the Vologda Oblast (by 6 percentage points, from 33 to 39%). The slight growth rate of the need for change (compared to the average Russian trends) may well be related to a more traditional and conservative way of life in the region. However, as in Russia as a whole, the general trend of growing needs of residents of the Vologda Oblast for changes in the economic and political situation in the country also takes place.

Insert 4

Level of trust in state and non-governmental institutions

Institutions	1996	2000	2008	2012	2014	2018	2019	Dynamics + / –, 2019 to…		
								1996	2000	2018
RF President	26.5	57.1	65.2	45.7	57.0	60.5	52.4	+26	-5	-8
Church	37.9	42.3	51.9	41.4	44.7	50.0	46.5	+9	+4	-4
Prosecutor's office	18.2	30.9	40.9	33.9	38.6	47.1	43.6	+25	+13	-4
Government of the Russian Federation	18.5	42.7	60.2	39.6	48.4	47.3	41.0	+23	-2	-6
Federal Security Service	12.6	34.2	43.8	33.2	36.4	45.2	41.0	+28	+7	-4
Army	34.2	37.0	37.8	31.3	37.9	47.2	40.8	+7	+4	-6
Police	14.1	27.2	36.5	29.3	35.4	44.4	40.7	+27	+14	-4
Court	19.8	31.6	41.3	36.1	36.9	45.3	39.4	+20	+8	-6
Oblast Administration	14.2	31.3	48.6	34.6	37.5	35.4	33.5	+19	+2	-1
Federation Council	13.4	28.3	47.6	32.3	40.2	37.4	32.2	+19	+4	-5
Local Government*	–	–	40.9	29.3	35.1	34.4	31.6	+32	+32	-3
Trade unions	20.2	28.4	35.9	25.6	26.6	33.3	29.7	+10	+1	-4
State Duma	14.8	23.0	42.0	30.5	35.2	33.8	28.6	+14	+6	-5
Civic Chamber of the Russian Federation	–	–	–	28.1	32.8	31.0	27.4	+24	+27	-4
Mass media	15.4	33.4	35.2	29.5	28.0	29.8	26.7	+11	-7	-3
Civic Chamber of the Oblast	–	–	–	25.4	29.4	28.3	25.6	+26	+26	-3
Non-governmental organizations	–	–	32.6	26.5	25.5	28.1	24.9	+25	+25	-3
Directors, business leaders	5.2	19.6	30.5	25.1	21.9	25.1	20.5	+15	+1	-4
Political parties, movements	6.8	10.7	26.8	20.9	20.2	22.3	19.7	+13	+9	-3
Banking and business circles	8.5	12.4	26.6	21.3	18.9	20.7	17.6	+9	+5	-3

The dynamics of institutional trust based on the results of a monitoring conducted by VolRC RAS in the Vologda Oblast shows that **over the past year the level of trust in almost all state and non-governmental institutions has decreased slightly (by 3–8 percentage points)**. However, this is not a unique trend for the region. For example, according to IS RAS data, only the trust in the Army (66%), trade unions (25%) and the Russian Academy of Sciences (48%) remained stable out of 17 institutions (including authorities, media, political parties, etc.) has declined[16].

[16] *Russian society after the presidential election-2018: request for change: an information and analytical report. Moscow, 2018. P 35; On the pressing problems of our life and the interaction of regulators, business and citizens: a report on the results of a mass sociological study. Moscow, 2019. Vol. 1. P. 82.*

Insert 5

Evaluate your family's need for goods and real estate...

*(answer option "We have enough"; % of respondents)**

Answer	Bottom 20%			Middle 60%			Top 20%		
	1999	2019	Dynamics + / –	1999	2019	Dynamics + / –	1999	2019	Dynamics + / –
Outerwear	22.0	45.3	+23	23.9	62.6	+39	39.6	77.5	+38
Light clothing	29.9	51.4	+22	38.6	69.9	+31	53.0	80.8	+28
Footwear	18.5	46.7	+28	24.2	62.6	+38	38.3	78.3	+40
TV	33.3	54.0	+21	39.9	64.4	+25	43.7	79.7	+36
Computer	–	32.6	+33	–	41.6	+42	–	69.6	+70
Mobile phone	–	51.8	+52	–	61.9	+62	–	80.4	+80
Vacuum cleaner	34.3	40.2	+6	44.5	54.4	+10	55.6	69.6	+14
Washing machine	49.8	50.7	+1	54.3	64.8	+11	59.0	79.7	+21
Fridge	52.3	54.7	+2	60.1	67.1	+7	67.8	80.8	+13
Furniture	33.9	49.3	+15	42.2	54.4	+12	45.2	71.0	+26
Car	4.6	18.1	+14	12.7	25.9	+13	29.3	44.9	+16
Apartment	–	33.7	+34	–	41.2	+41	–	53.3	+53

* The question is asked once a year (in February). The wording of the question is: "Evaluate your family's need for industrial goods, housing".
The table lists the categories of goods that appeared in the 2008, 2012, 2018, and 2019 surveys. in 1999 and 2000, some of the answer options were not available or other formulations were used.

Over the period from 1999 to 2019, the availability of basic industrial goods and real estate **increased significantly in all income groups**. Even among the bottom 20% in the Vologda Oblast, the number of people who own a car has increased by 14%; every third (33%), according to data for 2019, has a computer; more than half (52%) have mobile phones.

Insert 6

Proportion of people who believe that "it is no longer possible to tolerate our plight" *(% of respondents)*

Population group	1996	1999	2000	2008	2012	2014	2018	2019	Dynamics + / –, 2019 to…		
									1999	2000	2018
Sex											
Men	37.3	45.2	22.2	11.9	16.4	13.2	15.2	16.8	-28	-5	+2
Women	40.8	49.5	26.1	13.1	15.3	12.0	17.2	17.5	-32	-9	0
Age											
Under 30	30.5	38.5	17.5	9.3	13.5	8.5	13.5	12.3	-26	-5	-1
30-55	41.2	48.4	25.6	11.7	15.7	12.9	16.2	17.0	-31	-9	+1
Over 55	41.9	54.5	29.1	16.9	17.9	14.8	17.7	19.6	-35	-10	+2
Education											
Secondary and incomplete secondary	38.8	50.9	27.8	15.3	21.2	17.6	20.9	21.5	-29	-6	+1
Secondary vocational	43.9	48.6	23.3	13.3	16.1	11.6	14.7	14.7	-34	-9	0
Higher and incomplete higher	33.5	41.4	20.5	8.4	10.6	7.9	13.6	15.6	-26	-5	+2
Income groups											
Bottom 20%	52.1	61.5	40.6	22.6	28.1	26.6	29.2	29.1	-32	-12	0
Middle 60%	40.3	48.9	23.5	12.2	15.4	10.9	14.6	15.7	-33	-18	+1
Top 20%	16.5	28.9	12.7	5.2	7.6	3.0	6.9	8.3	-21	-4	+1
Territories											
Vologda	34.0	44.4	25.4	12.7	14.3	8.5	18.5	19.5	-25	-6	+1
Cherepovets	25.5	42.7	20.2	9.0	10.2	7.5	17.4	17.9	-25	-2	+1
Districts	47.5	51.9	26.3	14.2	19.3	17.5	14.4	15.4	-37	-11	+1
Oblast	39.2	47.6	24.5	12.5	15.8	12.5	16.3	17.2	-30	-7	+1

During Vladimir Putin's presidential terms, the share of people who say that "it is no longer possible to tolerate our plight" has significantly decreased in all major segments of the population. By 2019, the proportion of those who share this opinion has decreased by 5 to 10 percentage points compared to 2000 and by 20–30 percentage points compared to 1999.

Nevertheless, since 2008, the pace of this positive trend has decreased slightly, and in 2019, compared to 2018, no significant changes were observed in any of the socio-demographic groups.

Nevertheless, today there is virtually no disagreement in the expert community concerning the fact that the order of the power vertical achieved by the President has significant flaws, since it resembles, rather, a tangle of contradictions, the only balance of which is V. Putin personally. Other spheres of life are filled with the same contradictions: there is a sovereign democracy alongside extremely liberal ruling elites; anti-Russian sentiments are becoming more widespread with the growth of Russia's geopolitical status; against the background of optimistic prospects and achievements voiced by the media and official rhetoric of the government, people are increasingly irritated by the stagnation of the economy and the lack of real progress in the dynamics of the standard of living; while the process of rejuvenation of the Governor's corps and strengthening the potential of the Russia's personnel reserve inspires hope for a dynamic transformation of the entire management system, specific actions and words of local

> The liberal and patriotic ways of life that V. Putin took control of were growing, their contradictions were smoothed out, because their growth was managed from the same center – from the Kremlin. And President Putin, patronizing both ways, himself consisted of two Putins: a liberal-Pro-Western Putin and a patriotic-centralist Putin. The development of a new Russia – Putin's Russia – took place against the background of these managed structures, between which a balance was observed. The crowning achievement of Putin's development was the return of Crimea – the fact that for a brief moment united all of Russia. **But when this moment passed, development ceased and Russia stopped, these two ways continued to grow and strengthen, but were already getting out of the control of the President**[16].

authorities that demonstrate a disdain for "ordinary" people cause tension. Optimism and realism in achieving the ambitious strategic goals expressed in the President's pre-election Address to the Federal Assembly[17], today, they are more than "compensated" by the unsuccessful launch of national projects[18].

It is not surprising that many experts give vague or even pessimistic assessments of the prospects for the development of Russian society and the state against the background of contradictions in the administration system. Thus, according to the results of an expert survey, which was attended by 154 specialists from among managers, public figures, representatives of business, media, science[19] and so on, Russian sociologists have made the following conclusion: "The opinions of experts regarding the likely phenomena, events and processes in Russian society in the next five years can not be called definite... Such processes as **rising unemployment and falling political loyalty and trust in the government, state institutions, courts and law enforcement agencies** were identified as **the most likely** ones... Among **the least likely** were the spread of ideas of isolation (separatism) in certain regions of the country and **the growth of public trust, a tendency toward solidarity, self-organization** (3/4 of experts estimate their probability is not higher than 50%)..."[20].

[17] Address of the President to the Federal Assembly 01.03.2018. *Official website of the President of the Russian Federation*. Available at: http://www.kremlin.ru/events/president/news/56957

[18] We analyzed the expert assessments on this issue in detail in the article: Ilyin V.A., Morev M.V. Nationally oriented rotation of the elites – the most important condition for the implementation of national projects. *Economic and Social Changes: Facts, Trends, Forecast*, 2019, vol.12, no. 4, pp. 9–25.

[19] The expert survey was conducted by the research center of the Institute of Sociology of the Russian Academy of Sciences with the participation of the ZIRCON research group in July – October 2015. 154 experts from 65 regions of Russia participated in the survey.

[20] Gorshkov M.K. et al. *Rossiiskoe obshchestvo i vyzovy vremeni. Kn. 4* [Russian society and the challenges of the time. Book 4]. Moscow: Ves' Mir, 2016. Pp. 326, 331.

[16] Prokhanov A. President Putin's broad daylight. Available at: https://izborsk-club.ru/18204

In general, we can say that the future of Russia is seen by experts as very bleak. Only one expert out of more than 150 respondents spoke in favor of a relatively positive scenario for the development of countries"[21].

The main difference between the upcoming transfer is that its task is to create conditions for a soft transformation of the system, whereas the previous transfer [under Yeltsin] set out to preserve the main contours of the system as much as possible and in no case change anything in it. One successor was selected for the task of preserving the conditions, the other is selected for the task of ensuring their change"[22].

Thus, in order to prevent expert forecasts from becoming true, Vladimir Putin will have to solve the problems, to which he slowly but surely approached all the years of their presidential terms, he has to overcome the "tunnel vision" views of the ruling elite, responsible for the internal development of the country, for timely and effective implementation of the instructions of the President, national projects, etc. This will inevitably require taking "long overdue, difficult but very necessary decisions"[23]. In our opinion, these decisions including those related to personnel.

A significant "help" to the head of state in solving this problem can be the system of civil society institutions built by V. Putin. It is far from perfect, there are many "gaps" in it, and it cannot seriously affect the decisions made by the liberal elites. **But Putin (in addition to the**

fact that he created it in principle and supported it throughout all his presidential terms) provided it with the main thing — an ideological vector. He could not "instill" this in the ruling elite, which was created under Yeltsin. In particular, this ideological vector is to reflect the interests of broad segments of the population rather than narrow social groups; to ensure that the government is not so much legal as legitimate, that is, its positive perception in public opinion assessments; as well as the active participation of civil society institutions and initiative citizens who are not indifferent to the country's problems in a constructive dialogue with representatives of government bodies at all levels of the power vertical.

Today, the quality of our state lags behind the readiness of civil society to participate in it. Our civil society has indeed become more mature, active and responsible. We need to update the mechanisms of our democracy. They must "accommodate" the increased social activity...

It is necessary to set up the mechanisms of the political system in such a way that it **would timely capture and reflect the interests of large social groups and ensure that these interests are mutually agreed upon. It could ensure not only the legitimacy of the power, but also the confidence of the people in its justice (including in cases where they are in the minority)...**

We need a mechanism with the help of which **the people can support responsible people, professionals at all levels of power who think in terms of national and state development and are able to achieve results. We need a clear, operational and transparent mechanism for developing, making and implementing decisions – both strategic and tactical...Citizens, professional and public associations should be able to "test" all state documents in advance**[24].

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[21] Gorshkov M.K. et al. *Russian society and the challenges of the time. Book 4.* Moscow: Ves' Mir, 2016. P. 331.

[22] Khaldey A. What is the difference between the transfer under Yeltsin and the transfer under Putin? Available at: http://zavtra.ru/blogs/chem_transfer_pri_el_tcine_otlichaetsya_ot_transfera_pri_putine

[23] Address of the President to the Federal Assembly 01.03.2018. *Official website of the President of the Russian Federation.* Available at: http://www.kremlin.ru/events/president/news/56957

[24] Putin V.V. Democracy and the quality of the state. https://www.kommersant.ru/doc/1866753

Vladimir Putin paid considerable attention to all these points in his 2012 program article "Democracy and the quality of the state".

However, the development of civil society and its role as a subject that expresses the interests of the general population (and not only of socially vulnerable categories) is complicated by a number of factors, largely stemming from the liberal foundations of domestic policy implemented by some of the ruling elites for several decades. **First of all, the internal situation in the country is built in such a way as to minimize the system of limits and restrictions for the ruling political and financial elites.** Therefore, civil society institutions, although they do help socially vulnerable and other groups to live in the conditions created by the country's ruling elites, **are "excluded" from the process of creating these conditions.** Their "point" victories on site are not able to affect the system as a whole.

> From the citizen's point of view, it is fundamental that **an institutional system that works for representative democracy should be open, accessible and accountable.** It should signal citizens about how to behave properly and who to ask for a specific area of society's life...In Russia, as a state with an insufficiently stable economy and a poorly functioning political system, the constant interaction of society with the authorities is **necessary to ensure socio-political stability and further development**[25].

Key public institutions claim that "civil society is a legitimate partner of the state"[26];

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[25] Krasnova A. The problem of interaction and mutual understanding of civil society and the Government of the Russian Federation at the present stage (2019–2020). Available at: https://strategy24.ru/rf/news/problema-vzaimodeystviya-grazhdanskogo-obshchestva-i-vlasti-rf

[26] Russian breakthrough and the challenges of civil society: a special report prepared on the basis of the decision of the Civic Chamber of the Russian Federation dated 08.04.2019. Moscow: Sovr-e inf-e sist., 2019. 60 p. *Official website of the Civic Chamber of the Russian Federation*. Available at: https://www.oprf.ru/press/news/2019/newsitem/51383.

however, this remains only a theoretical position for the time being. High-profile management decisions are not submitted to a broad public discussion and are taken even when they are sharply and openly opposed by the people who are directly affected by these decisions (for example, it was the case with the introduction of the Unified State Exam in the education system, the reform of the Russian Academy of Sciences, monetization of benefits, raising the retirement age, optimizing health care, etc.). There is no practice of discussing by name the candidates of Government members who are called to bear personal responsibility for the implementation of tactical and strategic tasks of Russia's development; this list is formed "behind closed doors" and is presented to Parliament and society only as a fait accompli.

The reason is that the Constitution of the Russian Federation significantly restricts the powers of the Federation Council and the State Duma in performing their main functions — representing the interests of the population in power and participating in the legislative process. The main activities of the Government of the Russian Federation, its structure, candidates for key positions in accordance with articles 112 and 113 of the main document of the country are determined by the Prime Minister, who is nominated by the President (Article 111). **Thus, the Constitution does not mention any personal discussion of the candidates of Ministers responsible for the state of affairs in their fields and for the implementation of the President's instructions. The Federal Assembly is excluded from this process.**

Another important point is that during the years of "stability", which under the liberal guidelines of the ruling elites gradually turned into "stagnation", Russian society (which acts as the foundation of civil society, since it is from its ranks that initiative leaders come out)

began to lose the "energy of a great goal", as sociologists warned when they noted the high level of social atomization of Russia throughout the entire period of the 2000s and early 2010s.

> **During the years of reforms, our fellow citizens became so immersed in their problems, and the state withdrew from the sphere of goal setting for development of the nation to such an extent that Russians gradually began to lose their previously characteristic power of the "big goal".** But it allowed them to repeatedly perform seemingly impossible things – just remember the country's industrialization, the recovery of its economy after the Great Patriotic War, the breakthrough into space, and many other things that Russians are still fairly proud of[27].

It is difficult to argue that **"pure consumption as the dominant goal of life leads society along a path that has no future"[28]. However, the administration system created in the post-Soviet period was aimed precisely at growing the "service economy" out of consumer citizens and out of the domestic economy"[29], this was necessary for the liberal elites to maximize Russia's "integration" into the Western world.** Activities implemented in the framework of the Bologna process have resulted in the fact that the education sphere ceased to provide a system-wide upbringing and education and was transformed into a complex of institutions providing only educational services; another consequence was the long-term dissatisfaction of the population with the dynamics of the standard of living and quality of life. All this has led to the fact that "our society has turned into consumer society in many ways"[30]; and in the absence of any ideology (which is stated in the Constitution of the Russian Federation), the vector of formation of its value norms is set today by those who possess these very material benefits — people who adhere to liberal values, including those of their representatives who belong to the ruling elites of the country.

An eloquent argument in favor of this thesis is the statistics on the growth of corruption and the number of dollar billionaires in Russia against the background of the continuing stagnation of the Russian economy and the popularity of the direct live TV phone-in with V. Putin, which provides ordinary citizens with a real chance for social justice.

> **The actual merging of the elite and the state apparatus is not perceived as an anomaly.** This is almost a natural state of affairs ...[31]

Since the beginning of Vladimir Putin's last presidential term, there have been no tangible changes in the psychological self-perception of society. According to Russian sociologists, "the analysis of changes in the socio-psychological well-being and level of material and social status of Russians shows that the year after the presidential election did not help to overcome the negative trends that accumulated during the economic crisis of 2014—2016, but contributed to the stagnation of most of them"[32]. **And when the foundation of civil society (the citizens themselves) consists of consumers and with each new generation this property of society is strengthened, then it is difficult to expect that civil society will "see" beyond private problems.**

[27] Gorshkov M.K., Krumm R., Tikhonova N.E. (Eds.). *What Russians dream about: ideal and reality*. Moscow: Ves' Mir, 2013. P. 312.

[28] Karacharovskii V.V., Shkaratan O.I. Different goals of one society. *Sotsis*, 2019, no. 1, p. 15.

[29] Betelin V.V. Russia needs to abandon the "service economy" and shift to the economy of industrial production. *Ekonomist*, 2019, no. 2. pp. 3—12.

[30] Direct live TV phone-in with V. Putin, June 20, 2019. Official website of the RF President. Available at: http://www.kremlin.ru/events/president/news/60795,

[31] The state as the "master of society" (editorial). *Nezavisimaya Gazeta*, 2019, 2 December. Available at: http://www.ng.ru/editorial/2019-12-02/2_7741_red.html

[32] On the pressing problems of our life and the interaction of regulators, business and citizens: a report on the results of a mass sociological study. Moscow, 2019. Vol. 1. P. 4.

For 8 months of 2019, the damage from the ended criminal cases of corruption in Russia amounted to about 102 billion rubles. This was announced on November 18 by the deputy head of the Department for combating offenses in the sphere of distribution and use of budget funds of the Main Directorate of economic security and combating the corruption under the Ministry of Internal Affairs of Russia D. Sevastyanov. **Since the beginning of the year, the number of detected corruption-related crimes has increased by 4.7%.** In January – August, law enforcement agencies identified more than 3 thousand crimes committed by officials caught in bribery. Of these, 805 involved particularly large sus of money. **One thousand people were brought to criminal responsibility**[33].

And, nevertheless, we should note that it is the long-term unresolved current problems that today trigger the fact that **Russian society is changing; it ceases to be a passive object of management** (as it has been for the past 20 years). Signs of this process are already visible to the naked eye, and we should assume that this trend will not just continue on a new page of Russian history, but will become its main, dominant trend. Therefore, we should agree with some experts who claim that "**in the transit of power, the political forces that will offer the society a unifying model of economic development of a federal state, which has long been in demand by the society, will win**"[34].

Against the background of the transformations that are taking place in society, the role of constructive forms of expression of its increasing political and social activity, the role of civil society, is automatically updated. In this regard, it should be noted that the President, who made a significant (perhaps even decisive) contribution to its creation and development (through the establishment of key civil society institutions[34], provision of active support to civil initiatives and, in general, by "tuning" civil society to function in the interests of the nation), should continue this work and move to **solving higher-level tasks — to release the potential of civil society, to give it broader powers, make the Government and other officials responsible before it.**

We cannot but agree with the opinion of experts who express the following point of view: "What can the President do in the conditions of melting social time, which is more and more like flying up time? He can only launch the development, which will include both ways of life [liberal and patriotic] and the energy that has accumulated in these ways of life. Through development, which will again be led by himself, he will be able to manage both ways. A development model must be created that excludes the current neoliberal model that has stopped Russian historical dynamics"[36].

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[33] The Ministry of Internal Affairs: the damage in Russia from corruption in 2019 amounted to 102 billion rubles. *News Agency Eurasia Daily*, November 18, 2019. Available at: https://eadaily.com/ru/news/2019/11/18/mvd-ushcherb-v-rossii-ot-korrupcii-za-2019-god-sostavil-102-mlrd-rubley

[34] Vanin G. After Putin: the future transit of power in Russia. Available at: https://regnum.ru/news/polit/2756069.html

[35] Here we are talking about creation of the Civic Chamber of the Russian Federation in 2005 (Federal Law dated April 4, 2005 No. 32 "About the Civic Chamber of the Russian Federation"), the Russian Popular Front (ONF) in 2011, and legislative foundations of local self-government (Federal Law No. 131 of 6 October 2003 "On general principles of organization of local self-government in the Russian Federation"), the mechanisms of public control (Federal Law No. 212 of July 21, 2014 "On the fundamentals of public control in the Russian Federation") etc.

[36] Prokhanov A. President Putin's broad daylight. Available at: https://izborsk-club.ru/18204

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4. *O nasushchnykh problemakh nashei zhizni i vzaimodeistvii regulyatorov, biznesa i grazhdan: otchet po itogam massovogo sotsiologicheskogo issledovaniya* [On the pressing problems of our life and the interaction of regulators, business and citizens: a report on the results of a mass sociological study]. Moscow, 2019. Vol. 1. 120 p.

5. Gorshkov M.K. et al. *Rossiiskoe obshchestvo i vyzovy vremeni. Kn. 4* [Russian society and the challenges of the time. Book 4]. Moscow: Ves' Mir, 2016. 400 p.

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THEORETICAL ISSUES

The Successfulness of a Modern Individual: Theoretical and Methodological Aspects of the Study

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Abstract. The article discusses theoretical foundations of understanding success, substantiates methodological approaches to studying the successfulness of the 20th century individual, and discusses findings of an exploratory research conducted by an international team of scientists. We consider it important to study the social phenomenon such as "succesfulness of a modern individual" in the context of their satisfaction with important aspects of life and work and from the perspective of a wide range of socio-cultural, socio-psychological and demographic determinants. The study uses methods developed in various fields of social and humanitarian science; the methods describe the phenomenon[1] of success in a meaningful way and identify its prevalence and manifestation features in different countries (in this project – Russia, Poland and Belarus) and in specific groups within countries. An exploratory research performed in this way has an interdisciplinary basis and relies on the synthesis of econometric (modeling, correlation and regression analysis), sociological (questionnaire survey), and psychological (testing) methods. The article presents findings of a pilot sociological survey and psychological testing of the population of different cities of Russia (Vologda, Cherepovets, Petrozavodsk, Kolomna), Belarus (Minsk)

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[1] A philosophical term, which has a wide range of meanings and acts as a basic, complete and reliable unit of what can be singled out in a consciousness (from the Greek word *phainomenon*, which means *manifesting itself*).

and Poland (Lublin). The pilot stage of the comparative cross-country study involved empirical testing of the selected tools in determining success factors in different linguistic, cultural and political environments, searching for methodological approaches to the essence of the phenomenon under consideration, and the operationalization of the concepts used. Successfulness[2] has been studied in terms of self-esteem and in relation to life satisfaction. The study covered main spheres and conditions of human life. We tested relevant hypotheses that we had confirmed in the course of regional studies. The scientific significance and novelty of the research lies in the exploratory nature of the project, an attempt to solve a scientific problem by integrating knowledge and methods from various scientific fields. The findings of the study, its conclusions and models can become the basis for the development of a full-fledged concept of "modern successful individual".

Key words: success, methodology, society, sociological survey, needs, sustainable development.

Introduction

According to D. McClelland's Need Theory, "the need for achievement is a key factor in economic growth" [1, p. 285]. Those countries where a desire for success is widespread (e.g., in many Western European countries, USA, Japan) have a higher level of GDP and faster economic and social development [2, p. 302] Almost any jump in "intensive economic development", according to D. McClelland is "preceded by the spread of the "need for achievement" [2, pp. 302, 303] and a high level of desire for success. This is due to the fact that in such societies "there are always a lot of energetic entrepreneurs who contribute ... to faster economic growth" [1, p. 465]. The ideologists of the theory of the "welfare state"[3], whose main task is to ensure the evolutionary progressive development of all strata of society [3], also pointed out that "... the wealth, power and happiness of the state depend on the welfare of its individual citizens" [4].

At the same time, the motivation for success in psychological and sociological consideration is contradictory both for an individual and for building social relations in society. The versatility and multiple effects of success as a social phenomenon predetermine the need to study it from the point of view of various social sciences. However, the phenomenon of success has not yet become the subject of targeted interdisciplinary scientific analysis. Some works on this problem consider certain aspects and elements of "success"[4]. Thus, the category of "success" and the empirical indicators of "successfulness" require further theoretical and methodological analysis in order to create relevant models of modern successful people taking into account socio-cultural, demographic and socio-economic differences within and between countries.

This has become a starting point for the joint study "Modern successful individual" carried out by an international research team that unites scientists (psychologists, economists,

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[2] Successfulness is an empirical indicator (construct), which allows us to carry out measurement procedures for the subjective assessment of success.

[3] The German scientist L. von Stein (1815–1890) is considered to be the author of the concept of the social state. This idea was also addressed by Yu. Offner, F. Naumann, A. Wagner, G.W.F. Hegel, W. von Humboldt, N.Ya. Danilevsky, V.I. Lenin, K. Marx, F. Engels, etc.

[4] Life successfulness, personal life path, subjective resources of successfulness, responsibility as a determinant of successfulness, education and successfulness, social successfulness, professional success, gender aspect of success, educational successfulness, etc.

sociologists) from Russia, the Republic of Poland and the Republic of Belarus. The goal of the project, which is currently being carried out by the research team, is to determine the features of a modern successful person in the context of satisfaction. The study is designed to answer the questions: who is a successful person, what is their psychosocial image; what are their socio-demographic characteristics; what is their satisfaction with various aspects of life; what are the socio-economic effects of success; what is the role of socio-cultural drivers of success.

Given the multidimensionality of the conceptual construct "successful person", the study was based on the principles of the socio-cultural approach, which due to "the possibility of connecting different aspects of the vision of the object allows us to show it as a bright, multifaceted, living entity in continuous development" [5]. Pitirim Sorokin identified this approach as an inseparable triad – "individual, society, and culture", highlighting the aspects of their socio-cultural interaction, inseparable from each other: "an individual as a subject of interaction; society as a set of interacting individuals with its socio-cultural relations and processes, and culture as a set of values and norms owned by interacting persons, and a set of carriers that objectify, socialize and disclose these values. None of the members of this inseparable triad (individual, society and culture) can exist without the other two" [6, p. 218]. Modern researchers believe that this approach "integrates the three dimensions of human existence (the individual with their relationship with society, the nature of culture, the type of sociality) as fundamental, each of which is not reduced to others and is not derived from them, but

they are all interconnected and affect each other as the most important components of human communities" [7]. The appeal to the socio-cultural approach[5] is connected with the emphasis on the spiritual factors in social and economic development and socio-cultural and socio-psychological factors in the well-being of society [8]. The growth of the number of empirical studies focused on the study of life satisfaction, happiness level and subjective well-being also indicates the interest in this direction [9]. We think that among the above-mentioned non-economic factors, there is the phenomenon of "success" and successfulness as its subjective perception. The appeal to this problem is explained by the fact that the practice of studying the state of society through the prism of negative indicators (disease, mortality, poverty, deviations) has taken root, and this is methodologically not quite correct, since the factors in positive states (social order, health, well-being) and negative states (deviations, diseases) differ. Thus, according to RAS Academician M.K. Gorshkov, the success of the modernization of society is increasingly associated with the improvement of the social environment, the spiritual development of society and the moral state of people [8].

Progressive development of any state is largely based on the effective work, success and achievements of each of its citizens in personal, professional and civic activity. How successful are people from different countries? If we consider indicators that indirectly give us an idea about the success of citizens, we will see that, for example, the happiness index

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[5] In the context of our research, the tradition goes back to the works of Max Weber *The Protestant Ethic and the Spirit of Capitalism, Economic Ethics of the World Religion.*

calculated for 156 countries[6] shows that its value is higher in Finland (happiness index-2019 is 7.8 points). Poland is on the 40th position in this rating (6.2 points), the Russian Federation – on the 68th (5.6 points), Belarus – on the 81st (5.3 points) [10]. Studies show that happy employees are 12% more productive [11]. Accordingly, if a person is successful and happy, then their work performance provides a significant benefit for economic development.

Over the course of history, the understanding of achievement and success has changed, and nowadays these phenomena are manifested in different cultures in different ways [12]. For example, in a research conducted by the Public Opinion Foundation (FOM) in 2017, the answers of Russians to the question "What is success in life to you personally? How would you define it?"[7] were as follows: at the top of the rating: "happiness in my personal life, well-being of my family, children, grandchildren" (32%), "material well-being, prosperity" (27%), "good, interesting, favorite work, successful career" (20%), "health of my loved ones" (13%). The most important components of the life success of Poles[8], according to a study

by the Institute of Public Opinion "Homo Homini", are "family" (58%) and "good job" (56%), and these two components outstrip others such as "my own home" (23%), "love" (22%), "good education" (22%), "money" (10%). For comparison, we should mention that for Americans, "success" is not so much a statement of achievements, as "a social norm ..., a vital imperative ... a way of positioning... "I am an American" already implies superiority and higher starting positions" [13].

The given data show that, despite some similarity of positions in a self-assessment of success, there are essential differences connected both with cultural (in particular, mentality) and institutional conditions in different countries. These features, as well as the range of socio-cultural, socio-psychological and demographic factors that determine the motivation for success, are within the research field of the project described in the present paper.

Theoretical and methodological review

The idea of success is studied in different areas of scientific knowledge (psychology, economics, sociology, philosophy, cultural studies, etc.), each of which considers specific facets of this phenomenon [14].

Philosophical substantiation of the phenomenon of success is mainly connected with the problem of values, as well as with self-identification of an individual and their self-esteem [15]. The analysis of socio-philosophical approaches that study the phenomena of "success" and "successfulness" in different historical periods [16] shows that "success in the modern understanding of this concept is revealed by ontological characteristics of an individual" [16] that determine the effectiveness of social actions (the use of hidden reserves, independence and responsibility in planning activities focused on success, self-realization, self-actualization, self-satisfaction in activities, professional competence, etc.).

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[6] The Happy Planet Index is a combined indicator of the British research center New Economic Foundation. The calculated happiness index takes into account: *GDP per capita*, taking into account domestic prices(PPP); *healthy life expectancy*, *social support* - the answer to the question "If you had a problem, could you count on the help of relatives or friends if necessary?"; *generosity* – the answer to the question "Did you spend money on charity last month?"; *freedom to make life choices* – the answer to the question "Are you satisfied or dissatisfied with the freedom to choose what you do with your life?"; *perceptions of corruption* – the answers to the questions "Is corruption widespread in the government?" and "Is corruption widespread in business?"; *subjective feeling of happiness* – the answers to questions about the past day: Did you laugh? Did you feel happiness? Were you worried? Did you feel anger?

[7] What is success? It is difficult or easy to achieve success for the residents of today's Russia. Available at: https://fom.ru/TSennosti/13865 (accessed 05.11.2019).

[8] A Polish model of success: the data of the survey "Who are we?" conducted among the inhabitants of Poland by the Institute for Public Opinion Research "Homo Homini". Available at: http://maxpark.com/community/politic/content/2103799 (accessed 12.08.2019).

In psychology and sociology, this issue is investigated in the framework of the theory of achievement motivation.

At the same time, two complementary views have been formed in the modern scientific literature. The first one focuses on the study of the conditions for achieving success and successfulness in the process of self-realization and self-actualization of an individual (A. Adler [17], A. Maslow [18], K. Rogers, V. Frankl [19], etc.). Self-actualization, according to representatives of this direction, is focused on something that exists outside the person (other people, sphere of activity, meaning). For example, V. Frankl wrote: "Self-actualization is not the final destination of a person. ... If we turn self-actualization into an end in itself, it will conflict with the self-transcendence of human existence. ... Only in so far as man succeeds in realizing the meaning which he finds in the external world does he realize himself. If he intends to actualize himself instead of making sense, the meaning of self-actualization is immediately lost" [19, p. 58-59].

Scientists of the second direction focus on the content and essence of personal success (D. McClelland [1], H. Heckhausen [12], E. Fromm [20], etc.). For example, E. Fromm in his research pays special attention to higher existential needs (establishing connections, overcoming, identity, system of views, etc.). Of course, the ways to meet these needs depend to a great extent on the type of social conditions that surround the individual, they significantly affect the ways to meet the needs [20].

In sociology, the analysis of this phenomenon is aimed at identifying the criteria and drivers of success, their representation in specific social groups and spheres of activity [21, 22, 23, 24].

The renowned Polish sociologist P. Sztompka notes the influence of M. Weber's idea about the search for spiritual determinants of macro processes in the sphere of individual motivations and values and identifies two classical vectors of research into the phenomenon of a successful person [25]. The first one, according to P. Sztompka, is associated with the name of E. Hagen [26], who introduced the concept of "innovative personality" as a prerequisite for economic growth and the spread of entrepreneurship. The second one is associated with the theory of D. McClelland [27], according to which the spread of the motivation for achievement precedes a leap forward in economic growth.

Empirical economics, when it studies general principles of behavior of subjects of economic relations, it analyzes the ways of achieving success at the macro- or micro-level of the national economy. And if the classics of economic thought (A. Smith [28], D. Ricardo [29], etc.) considered the growth of social wealth as an indicator of macroeconomic success, then the marginalists (K. Menger [30], W.S. Jevons [31], A. Marshall [32], J.B. Clark [33] et al.) focused on human behavior, the definition of its activity motives and aspirations. At the same time, they considered the maximum satisfaction of an individual's needs as the ultimate goal, i.e., "the maximization of welfare was understood as the maximization of utility" [34].

In modern economics, there is a new approach to indicators of success and efficiency of the economy of countries, based on the concept of "happiness economics". The concept of "happiness economics" is based on increasing the satisfaction and happiness of each person and each market subject. P.A. Sorokin believed that it is unacceptable to ignore happiness as a measure of progress, as, indeed, to exaggerate its importance: "All the criteria of progress, no matter how diverse they may be, somehow imply and must include the principle of happiness" [35, p. 511]. This direction focuses on subjective well-being,

defined as "a broad category of phenomena consisting in the emotional response of people" [36]; "happiness economics" uses it to assess the quality of objective living conditions of people [37]. In this issue, economists, sociologists and psychologists are in solidarity, because, according to scientists, society has entered the "economics of life satisfaction" [38, p. 122]. Life satisfaction is thus part of the broader concept of "subjective well-being", its cognitive side, which is complemented by emotions (positive and negative) experienced by an individual in a given period of time [39]. In this case, the economy is considered as a tool for creating well-being for society as a whole and for each individual [40]. Quality of life indicators are actively used for comparative analysis of countries' development. It also indicates attention to the subjective assessment of human well-being. N.M. Rimashevskaya notes that "the quality of life is the meaning of life of each individual and the population as a whole" [41, p. 185].

Thus, success (a broad, multifaceted and deep concept) is inextricably linked to the values and norms of an individual and society. Despite all the differences in the understanding of success and successfulness, there is a "common core of meaning" that is "dominated by areas of life such as work, knowledge and an open political system that provides freedom, in which an individual's initiative can lead to success". It is argued that "the commitment to family, tradition and interpersonal relationships should retreat and give way to the aforementioned areas" [12]. These statements, as we see, contain contradictory manifestations of the phenomenon of success and successfulness.

In periods of changing historical epochs, the accumulated scientific heritage is re-evaluated, enriched and developed, especially in the field of social science; new scientific paradigms are formed that meet the realities of a changing society. These include, for example, P. Sorokin's "integralism" — "a complex, synthetic, unifying approach to the study of society and man" [42]. According to P. Sorokin, man is one of the important creative centers ... of reality", who is able to "transcend the limits of his unconscious and conscious forces" and "who ... does it in the best periods of his intense creativity" [43]. In the 1930s, P. Sorokin warned that a person "sandwiched between two eras", when "old values are collapsing, and new ones have not yet strengthened, is lost in the wilds of the disintegrated sensual world and society" [43]. The scientist saw the way out in the spread of altruistic values. Representatives of the school of Russian cyclism (V.I. Vernadsky [45] et al.) developed this idea, justifying the "revival of high ... culture and humanistic-noospheric morality" through the partnership of civilizations [46, 47]. Such a change in the times was the end of the 20th century, which marked "the greatest geopolitical catastrophe" (collapse of the Soviet Union), which "broke the ongoing development of ... society" and caused fundamental "changes in politics, economy, and ideological systems" [49]. The consumer society began to emerge against the background of growing new needs. At the same time, consumption is a "factor in identity construction" [50]. "Goods become spiritualized and animated elements of social reality" [51]. The possession of a branded thing or its latest ultra-modern model is an indicator of success, the realization of the need for "self-expression, status, beauty, power" [51], etc.

The American psychologist T. Shibutani draws attention to the fact that in some cases the struggle for recognition, power and status, and the desire for both very high and very low goals are associated with rejection of oneself, because "to evaluate oneself means to consider oneself within a certain hierarchical system" [52]. Self-esteem is an important regulator of behavior, it depends on the relationship

of a person with other people, criticism and demands toward oneself, attitude toward success and failure.

An individual cannot be considered separately from the society, its traditions, foundations, level of economic and social development, as well as the society depends on how much human potential is developed in it, how much its members are interested in personal success and success of the society.

From the methodological point of view, the study of the phenomenon of a successful person can be considered as an attempt to combine [53, p. 14] cognitive means of various humanities on the basis of an interdisciplinary approach that gives a broader and comprehensive understanding. All the theoretical and methodological provisions given by us served as the basis to substantiate the methods and design of the study.

Research methods and tools

Beginning our research, we considered it important to study the phenomenon of a successful person not only in the context of their satisfaction with various aspects of life, but also their behavior within a wide range of socio-cultural, socio-psychological and demographic determinants, using methods developed in various fields of social and humanitarian science, allowing us to describe this phenomenon as an "ideal type" or model and to identify the features of its manifestation in different countries and in specific groups within countries.

Interpretation of the basic concepts

Before proceeding to the description of the research tools, let us focus on the main terms and concepts that are used in the work. We note that success was studied in terms of self-esteem in the context of satisfaction.

Success is a positive aspect of the subjective "good state" of an individual [54]; achievement of the goals, positive result of something, public recognition of something or someone[9].

Satisfaction is an emotional state arising from the implementation of a motive [55].

Satisfaction with life is a multi-valued and multidimensional term that reflects "the overall assessment of satisfaction with one's achievements and living conditions", which is determined by comparing one's position with one's established standards [56].

Life satisfaction is a general idea of a person about psychological comfort, which includes: a) interest in life; b) determination, commitment, consistency in achieving life goals; c) consistency between the goals set and actually achieved; e) positive assessment of one's own qualities and actions and e) the overall result of satisfaction with life.

Life stability – a) persistence and determination in actions; b) personal competence in overcoming stress, and tolerance to negative emotions; c) tolerance to failures and understanding of life as a challenge [54; 57].

Economic successfulness is satisfaction due to the possession of material goods, the level of consumption, quality of life and standard of living.

Professional successfulness is a set of positive results accumulated during career (work): "personal satisfaction with professional self-realization based on the effectiveness of personal and professional achievements on the way to professionalism and their recognition in a professionally significant environment for the actor" [58]. It is an integral phenomenon (quantitative and qualitative indicators of activity, psychophysiological costs, job satisfaction, evaluation of one's work and remuneration, relationships with colleagues and managers, their assessment of the actor's work, etc." [59, p. 302].

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[9] Kuznetsov S.A. (Ed.). *Comprehensive Explanatory Dictionary of the Russian Language. 1st edition*. Saint Petersburg: Norint, 1998.

Figure 1. Structure of the questionnaire

Socio-demographic characteristics	→	Family and children	Health	Gender and age characteristics
Psychological test	→	Interest in life	Consistency in achieving goals	Consistency between set and achieved goals
Economic successfulness	→	Consumption (marketing of life, quality of life)	Financial situation (including salary level)	Work activity (career, status, professional vocation)
Social successfulness	→	Social capital (trust)	Territorial identity	Civic engagement
Personal successfulness	→	Satisfaction with life and work	Self-assessment of successfulness	Emotional profile

Social successfulness is a set of achievements in a society (reference group), significant for the individual. It is expressed in the socially significant and recognized result of social actions of an individual, that is, the result that ensures high quality of spiritual and social life of an individual within social norms" [60, p. 20].

Life successfulness means personal achievements of an individual in accordance with the requirements that they set for themselves.

Personal successfulness is the criterion (assessment) of self-realization of an individual.

Emotional profile is the degree of distinct manifestation of the set of positive ("joy", "happiness", "peace", "feeling of harmony with the world", "feeling of luck") and negative ("feeling of fatigue", "stress, tension", "anxiety", "fear", "loneliness", "delight", "boredom", "despair") emotions [61].

At the first stage of our study, in order to test the tools, we conducted a sociological survey on the sample of 100 people (from 18 to 70 years old) for each territory[10], proportionally representing the population by sex and age.

The questionnaire for the pilot survey consisted of five interrelated blocks of questions *(Fig. 1)*:

Successfulness was studied in terms of self-esteem, covering the main areas and conditions of life. We tested relevant hypotheses that we had confirmed in the course of regional studies. The obtained empirical data will be used to substantiate the model of satisfaction of a modern successful individual.

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[10] The survey was conducted in various cities. In Russia – in cities of regional significance (Vologda, Kolomna) in the Republican capital – Petrozavodsk and in the industrial city – Cherepovets in the Vologda Oblast, in Belarus (the capital – Minsk), Poland (the administrative center of the Voivodeship with developed mechanical engineering – Lublin). Cities of the sample have different status, different population (from 140 thousand people – Kolomna, from 300 thousand people – Vologda, Cherepovets, Lublin, about 2 million people – Minsk), different socio-economic development (the state of budget security, the level and forms of employment, the level of development of social infrastructure, etc.), which helped achieve representation of the maximum diversity of the urban population in the sample.

In accordance with the research agenda associated with the comparison of heterogeneous social units (three countries, six cities, population with different views and values), the hypothesis of the relationship between successfulness and life satisfaction was formulated. At the same time, the object of the study – the urban population – will be internally differentiated by countries, types of settlements, sex, age and social status of respondents.

According to one of particular hypotheses, there were statistically significant differences in life satisfaction among respondents in the groups under consideration. To test the hypothesis *in the psychological block* of the study, the following methods were used.

For the analysis of life satisfaction the test[11] "Life Satisfaction Index" [62], consisting of five scales, was used. The scale of *interest in life* reflects the degree of satisfaction and activity in life. The second scale evaluated people from the position of *consistency in achieving goals*. According to its estimates, the level of achievement of life goals is highest in those who seek to realize their life goals and objectives. The scale of *consistency between set and achieved goals* characterizes people in terms of their awareness of their ability to achieve planned life goals. The fourth scale presents *self-assessment of oneself and one's own actions by identifying positive qualities and shortcomings*, including one's own competencies. High scores on this scale reflect such qualities as determination and

perseverance aimed at achieving goals. A low score reflects passive acceptance of life's failures and submissive acceptance of all that life brings. Realistic self-assessment shows that a person fully and reliably uses their capabilities to overcome any limitations and obstacles in life. The fifth scale shows the degree of optimism of a person and their satisfaction with life.

In order to analyze the situation "Overcoming stress and life difficulties", the Scale of Life Stability [57] (SPP-25) was applied, or rather its selected aspect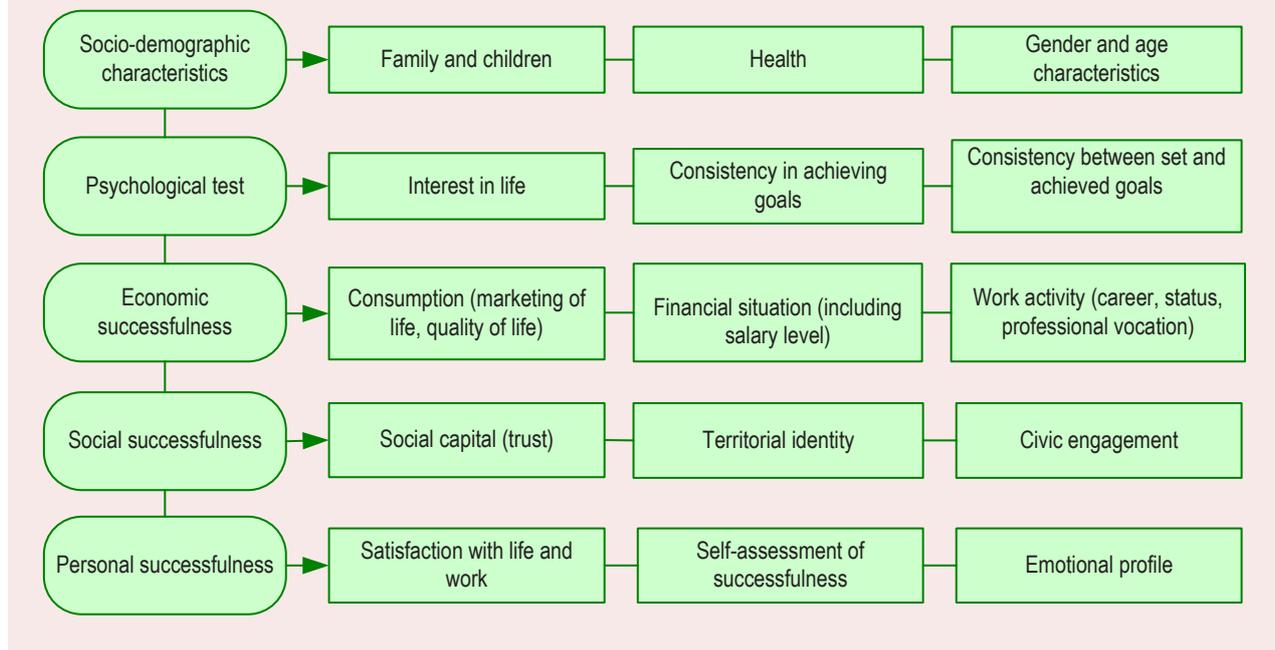s a) persistence and determination in actions, b) personal competence in overcoming stress, and tolerance to negative emotions c) tolerance to failures and understanding of life as a challenge. ANOVA[12] statistics were used to assess the level of life satisfaction in the groups under consideration. An additional test "post-hoc Tukey'a"[13] was used to determine statistically significant differences between the groups under consideration.

The problem of *economic successfulness* in the interdisciplinary study is investigated by a block of questions relating to:

– *consumption* (behavior of people in the consumer market, positioning of an individual in society, motives and incentives of rationality taking into account the received income and expenses, quality and marketing of life of respondents, opportunities for receiving

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[11] The methodology was translated and adapted by N.V. Panina in 1993. The questionnaire, which diagnoses the index of life satisfaction, reflects the general psychological state of a person, the degree of their psychological comfort and socio-psychological adaptation. The scale consists of 20 questions, the results of the answers of which are reduced to 5 scales that characterize various aspects of the general psychological state of a person and their satisfaction with life. The maximum life satisfaction index is 40 points. The average life satisfaction for 25 to 30 points. Indicators less than 25 points are considered low.

[12] The purpose of ANOVA (analysis of variation) is to test the significance of the difference between averages in different groups by comparing the variances of these groups. Dividing the total variance into multiple sources (associated with different effects in the plan) allows us to compare the variance caused by differences between groups with the variance caused by intra-group variability. The hypothesis being tested is that there is no difference between the groups. If the null hypothesis is true, the estimate of variance associated with intra-group variability should be close to the estimate of inter-group variance, if false – significantly deviate.

[13] Statistics: post hoc comparisons – the method of a posteriori multiple comparisons assumes the presence of more than two samples. This method is used for testing hypotheses and exploratory analysis.

qualitative, including elite, education, etc.). The inclusion of questions about the level of consumption and its relationship to individual's success is due to the fact that the population of different countries of the world today more often chooses this scenario of behavior, characterized by mass consumption of material goods and forming an appropriate system of values and attitudes. From 1960 to 2000, i.e. for 40 years, personal spending on goods and services worldwide has more than quadrupled (from 4.8 billion USD up to 20 billion USD)[14]. In Russia, this type of behavior began to emerge in the post Soviet period[15];

— *financial situation* (self-identification, characteristics of cash income, expenditures on buying expensive goods);

— *labor activity* (forms and methods of employment, degree (level) of realization of qualitative characteristics of the working population in work, intensity and productivity of work, status of the position and ideas about career growth, value of work, self-assessment of usefulness of an individual for society, conformity to a professional calling).

In addition to the above aspects of the economic content of the phenomenon of "successfulness", the problem of creative and inventive activity becomes relevant for the development of society [63; 64]. The possibility of self-realization in this area is one of the facets of modern success of an individual. In this regard, the project explores such an indicator as the frequency of manifestation of creative abilities at work and in everyday life.

Social successfulness "means the achievement of social status, the acquisition of social prestige, the acquisition of social and personal reputation. Possession of these parameters with a social sign "plus" already makes a person successful and success — socially tangible and ranked, and transfers a successful person to the rank of a new stratification — successful individuals" [65, p. 16]. Social capital is a key factor in the formation of social success of an individual, because the system of social networks, in which an individual is included, greatly increases their chance to implement successful life strategies [66]. Social capital is formed in various social groups — from the family to the nation; it is created and transmitted through cultural mechanisms such as religion, tradition, custom [67; 68]. One of the directions of functioning of social capital is civic activity, "expressed in ... the ability and desire to show one's own civic position, to defend personal and group interests and rights, this awareness of personal responsibility for the welfare of countries" [69]. In the present study, a separate block is devoted to the problem of *social successfulness*, presented by indicators relating to certain aspects of *social capital* (trust, virtual networks); *civic activity* (real participation in the life of one's city, region; the possibility of influencing the state of affairs in the region, etc.) and *territorial identity* (the possibility of self-realization in the region, the attitude toward the region of residence and its problems).

Personal successfulness as one of the aspects of life success implies a subjective level of assessment of the individual's life and activities. The level is based on personal (subjective) assessments of the success of social practices implemented by the individual and life in general, and these assessments may not always correspond to the standards of success

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[14] The History Of What Things Cost In America: 1776 to Today. Available at: https://247wallst.com/investing/2010/09/16/the-history-of-what-things-cost-in-america-1776-to-today/ (accessed 10.03.2019).

[15] Consumer society. *Portal "Slovari i entsiklopedii na Akademike"*. Available at: https://dic.academic.ru/dic.nsf/ruwiki/92833 (accessed 10.03.2019).

adopted in society. In other words, internal (subjective, satisfaction-based) recognition of successfulness of the results of one's activities is not always accompanied by the recognition of these achievements by society. This is how it differs from social successfulness. However, in many respects these are interpenetrating and interdependent constructs, which makes them difficult to differentiate, and, in our opinion, their differentiation does not carry a special semantic load. Conventionally, the components of personal success can be grouped as follows: family and children, leisure, health, spiritual and intellectual development, emotional experiences, etc. These questions in the study are considered in a special block, which allows us to assess the demographic behavior of people, life and family relationships, health and healthcare, and to show their importance in the phenomenon of successfulness.

We should say that satisfaction is one of the significant parameters of one's personal successfulness. The motivators that cause satisfaction include one's work [70], career prospects, responsibility and achievements of an individual or group in work [71]. In our study, the criteria of success are considered in the issues related to the analysis of satisfaction with life in general and its individual aspects, the current life situation, work, quality of services, etc.

Emotions are an important tool for understanding the logic of human behavior [52, 72]. Our project investigated the emotional profile of an individual depending on the self-assessment of their success. It was studied using such an indicator as the degree of expression of positive (joy, happiness, peace, a sense of harmony with the world, a sense of luck) and negative emotions (a sense of fatigue, stress, tension, anxiety, fear, loneliness, boredom, a sense of hopelessness). We put forward a private hypothesis that in the emotional profile of respondents who rated themselves as successful, positive emotions will be expressed stronger, and negative emotions will be weaker compared to other respondents. Looking ahead, we note that this assumption was confirmed.

Thus, when forming the tools and conducting analytical procedures, the scientific group was guided by the above methodological approaches to understanding the phenomenon of successfulness. We believe that the use of cognitive tools of various sciences used in this project will allow the team of scientists to develop an interdisciplinary approach to the study of successfulness of an individual in a modern society and to develop relevant models of satisfaction, taking into account the socio-cultural and socio-demographic context.

Main findings of the research

The results of the pilot survey conducted in three countries (Russia, Belarus and Poland) provide the basis for a preliminary analysis in the summarized form for all the territories under consideration.

In order to identify features of successfulness and test the hypothesis of the relationship between successfulness and life satisfaction, respondents were grouped as follows: the first group included those who gave an affirmative answer to the question "Do you consider yourself a successful person?"; the second group included those who gave a negative answer; the third group consists of respondents who said they found it difficult to answer.

According to the study, almost two-thirds of respondents from three countries described themselves as successful (58%; *Fig. 2*).

Results of the "Socio-demographic characteristics" block

One of the important results of the study is to identify the demographic characteristics of successfulness.

Figure 2. Distribution of answers to the question "Do you consider yourself a successful person", given by respondents from Russia, Belarus and Poland, %

I find it difficult to answer; 17.7

Yes; Sooner yes 57.6

No; Sooner no 24.8
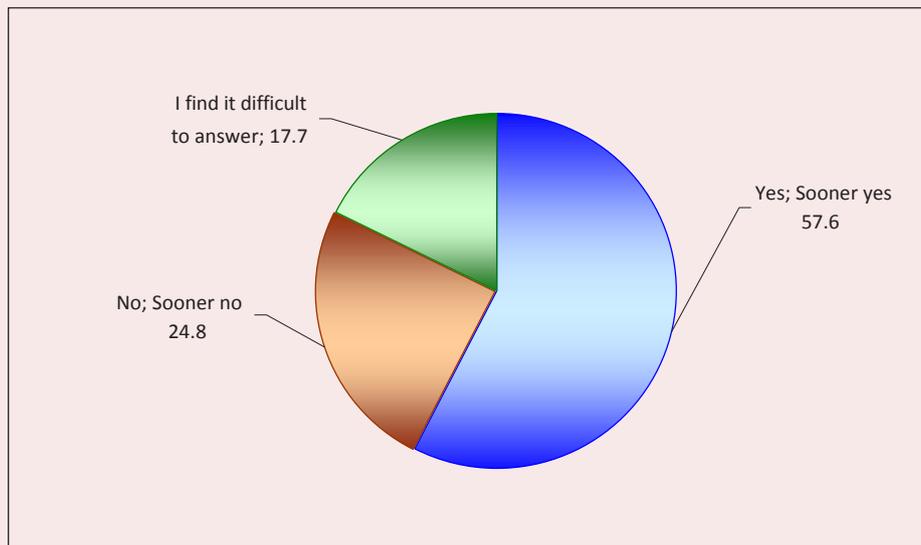
Source: data from a pilot survey of the population of the cities of Russia (Vologda, Cherepovets, Petrozavodsk, Kolomna), Belarus (Minsk) and Poland (Lublin), 2018.

Figure 3. Distribution of answers to the question "Do you consider yourself a successful person", given by respondents from Russia, Belarus and Poland and arranged according to their education,%
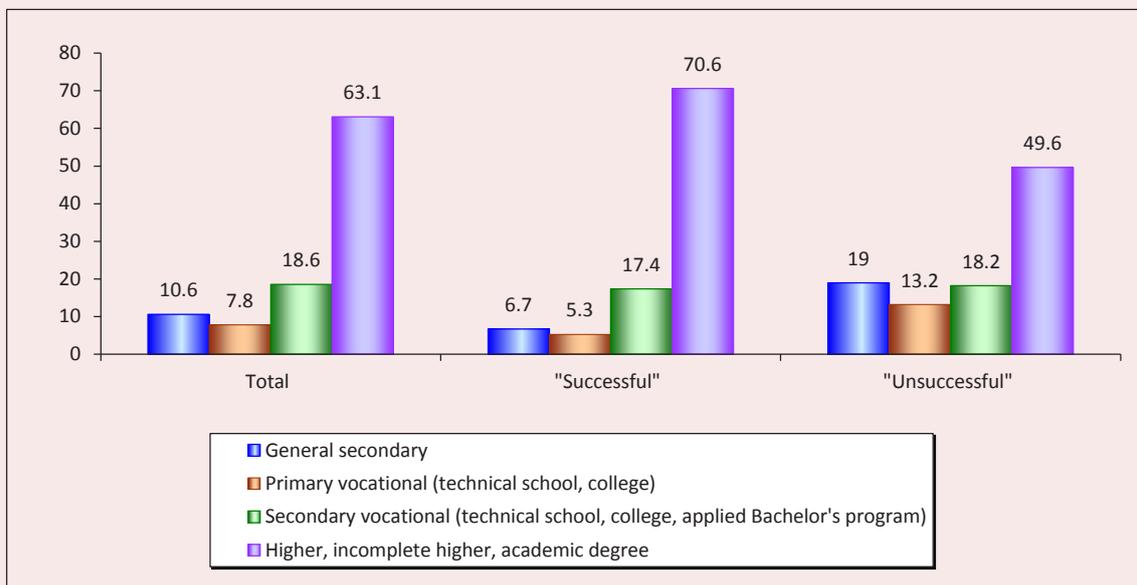
General secondary
Primary vocational (technical school, college)
Secondary vocational (technical school, college, applied Bachelor's program)
Higher, incomplete higher, academic degree

Source: data from a pilot survey of the population of the cities of Russia (Vologda, Cherepovets, Petrozavodsk, Kolomna), Belarus (Minsk) and Poland (Lublin), 2018.

The hallmark of success is the level of education. Among the respondents who considered themselves to be successful, there are mainly people with higher education and highly qualified specialists *(Fig. 3)*. In the group of "successful" respondents there are 1.4 times more those with higher education than among the "unsuccessful" ones.

The vast majority of respondents who consider themselves "successful", refer themselves to the category of citizens with average material wealth (81%); among the "unsuccessful" such people constitute only a half (50%). At the same time, more than a third of the "unsuccessful" correlate their situation with poverty (32%), and 13% – with extreme poverty *(Fig. 4)*.

As the study has shown, in general, self-assessment of successfulness is more typical of young people (25–29 years) *(Fig. 5, 6)*.

Figure 4. Self-identification of respondents from Russia, Belarus and Poland who answered the question "Do you consider yourself a successful person?", %
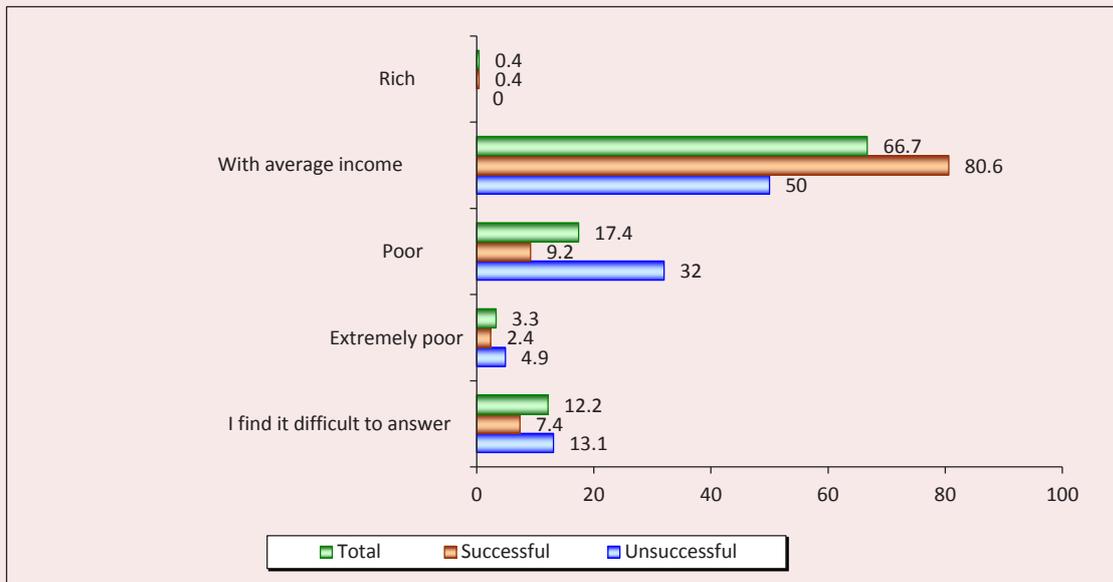
Source: data from a pilot survey of the population of the cities of Russia (Vologda, Cherepovets, Petrozavodsk, Kolomna), Belarus (Minsk) and Poland (Lublin), 2018.

Figure 5. Distribution of men by age and self-assessment of successfulness, %
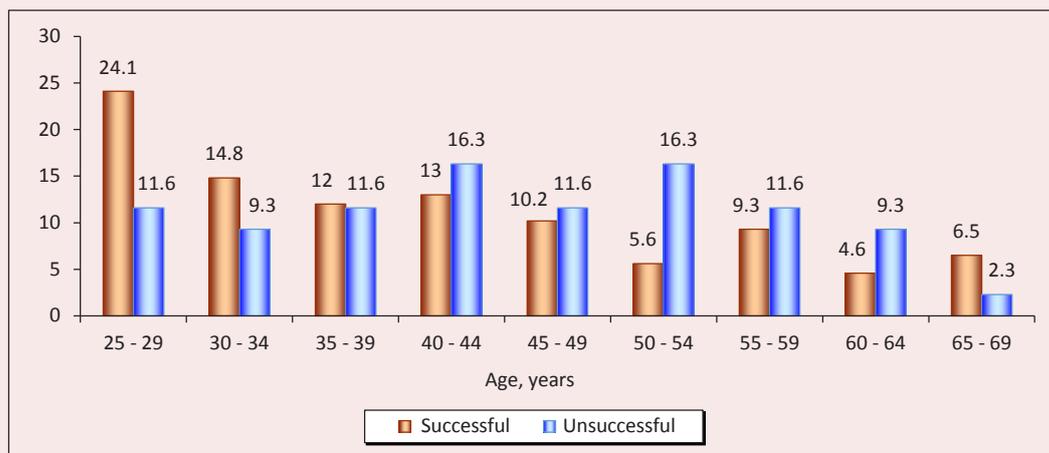
Source: data from a pilot survey of the population of the cities of Russia (Vologda, Cherepovets, Petrozavodsk, Kolomna), Belarus (Minsk) and Poland (Lublin), 2018.

Figure 6. Distribution of women by age and self-assessment of successfulness, %
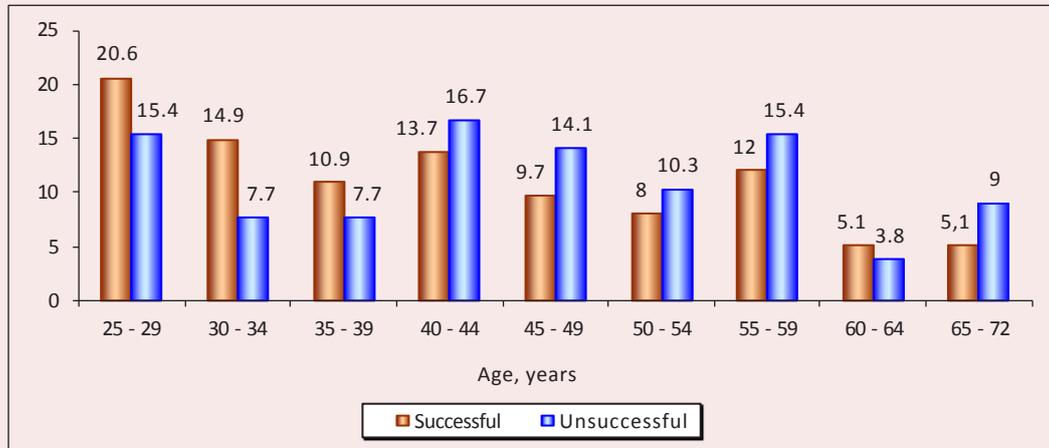
Source: data from a pilot survey of the population of the cities of Russia (Vologda, Cherepovets, Petrozavodsk, Kolomna), Belarus (Minsk) and Poland (Lublin), 2018.

At a young age there is enough strength and energy. Perhaps young people who have not experienced the breakdown of the social system and who have been developing in a market economy have a higher level of adaptation to new socio-economic realities. Positive self-assessment of success prevails in the age group 30−34 years, especially among the female population. The formation of this group also took place in new conditions. Among middle-aged people (40−44, 45−49, 50−54 years of age) there are more of those who rated themselves as "unsuccessful". The obtained results require further deeper understanding and meaningful interpretation.

Human health is the basis of the well-being of society as a whole and of the individual in particular. Achievement of success in realization of vital purposes of each person to a large extent depends both on the state of their health and on attitudes toward a healthy way of life. This assumption is confirmed by the surveys *(Fig. 7)*. The difference between groups of successful and unsuccessful people according to self-assessment of health is statistically significant. The number of successful respondents who answered that their health was "excellent and normal" is 1.3 times more and the number of successful respondents who answered that their health was "poor" is 2.6 times less than in the opposite group.

The obtained results allowed us to form a hypothetical portrait of a modern successful person. This is a person under the age of 40, with higher education, average material wealth according to their own self-esteem. They have a normal or excellent self-rated health, high level of professional qualifications, monitor their own behavior, are committed to a healthy lifestyle, have a stable family relationship, rely on their own strength and also on the support of their family.

The results of the psychological block

Preliminary results of the analysis of the psychological test of the study on life satisfaction, consisting of five scales, show that the level of interest in life, the achievement of life goals and internal consistency between the goals and their achievement in the countries as a whole is above average (from 4.9 to 5.4 points out of 8; *Fig. 8*).

Figure 7. Self-assessment of their own health by respondents from Russia, Belarus and Poland, on average and in the context of self-assessment of successfulness, %
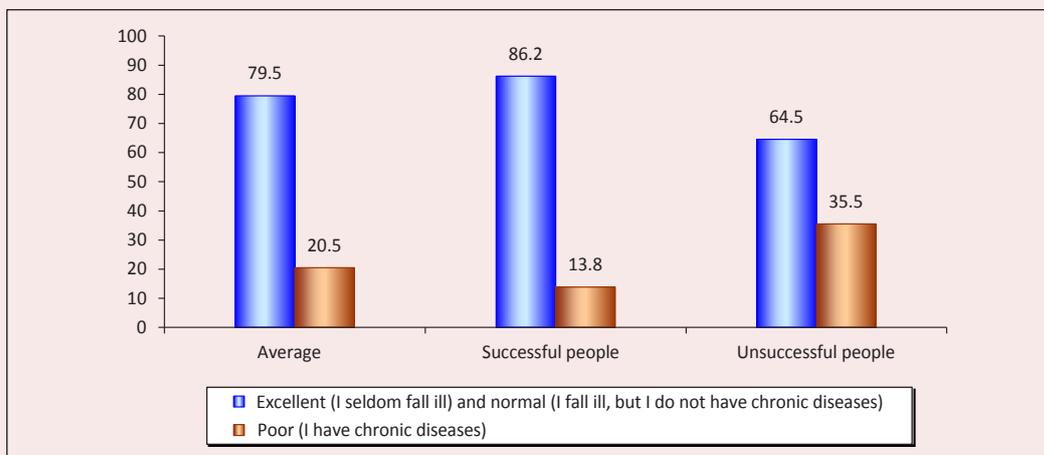
Source: data from a pilot survey of the population of the cities of Russia (Vologda, Cherepovets, Petrozavodsk, Kolomna), Belarus (Minsk) and Poland (Lublin), 2018.

Figure 8. Results of psychological test of life satisfaction (Life Satisfaction Index), average score*
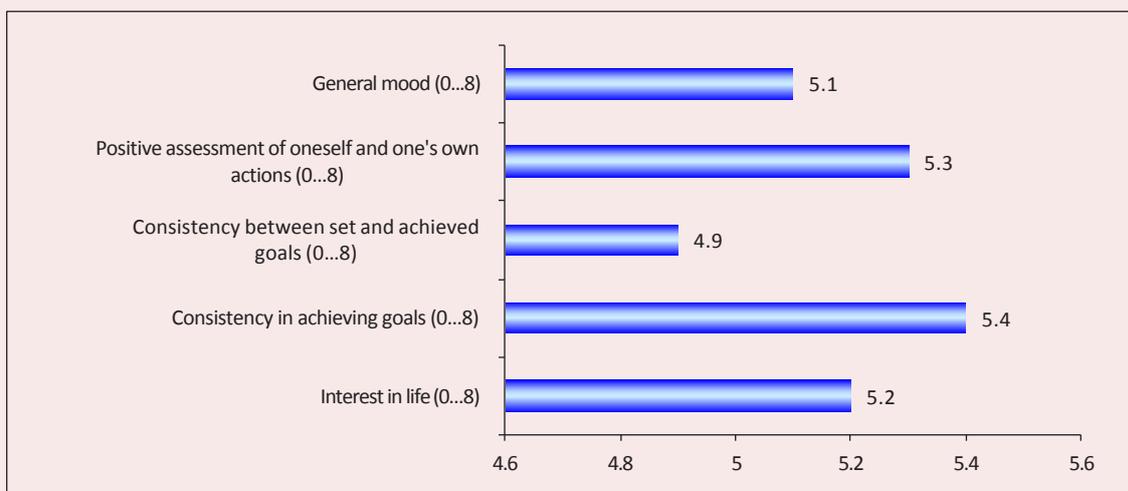
* Scale of results: min 0 ... max 8.

Source: data from a pilot survey of the population of the cities of Russia (Vologda, Cherepovets, Petrozavodsk, Kolomna), Belarus (Minsk) and Poland (Lublin), 2018, calculations by L. Suchocka.

The lowest score has a scale showing the consistency between the goals set and achieved (4.9 points). The results of the answers on this scale give information about the degree of conviction of a person in achieving or in the ability to achieve those goals that they consider important for themselves. Low scores indicate either that there is a mismatch in the assessment of respondents' plans, or that the goals have not yet been achieved, as they have a longer lag for their implementation. The latter assumption is more likely, since the score on the scale of "consistency in achieving your goals" has the highest score of all scales − 5.4.

Results of the block on economic successfulness

One of the markers of human success is the structure and volume of consumption. It directly depends on the satisfaction of the individual with their wages. The survey data show that in the assessment of wages in general, the position of the answers "completely and mostly dissatisfied" somewhat prevails – 33%. And in the group of "unsuccessful" respondents, the share of such estimates is more than two-thirds – 61%. In the group of "successful people", on the contrary, superiority belongs to positive responses (41%; *Fig. 9*).

The intensity of work and responsibility in work, as a rule, directly contribute to the success of a person, as evidenced by people's responses on the degree of use of their qualities in their work. At the same time, the successful part of respondents implements their qualitative properties to the full, and often at the limit of their capabilities *(Tab. 1)*. Especially significant is the difference in the answers about the desire for promotion, the manifestation of initiative

and enterprise – in 7 times according to the answer "to the fullest extent".

It is confirmed by the answers to the question about the professional career of respondents. For all the time periods proposed in the set of tools (over the past five years, one year and six months), "successful" people noted an improvement in their job positions. The difference in the corresponding answers between them and the group of "unsuccessful" persons is from 1.5 times in the position "for the last five years" to three times in the positions "for the last year and six months".

One of the hypotheses of the study was the assumption about the balance of work and family life in "successful" working parents. We consider this hypothesis is due to the fact that in today's rapidly changing world, most parents are concerned with solving economic rather than educational problems. The study shows that respondents participating in the survey at all its points are almost equally satisfied with their professional activities and life in general

Figure 9. Satisfaction with wages in the context of self-assessment of successfulness, %
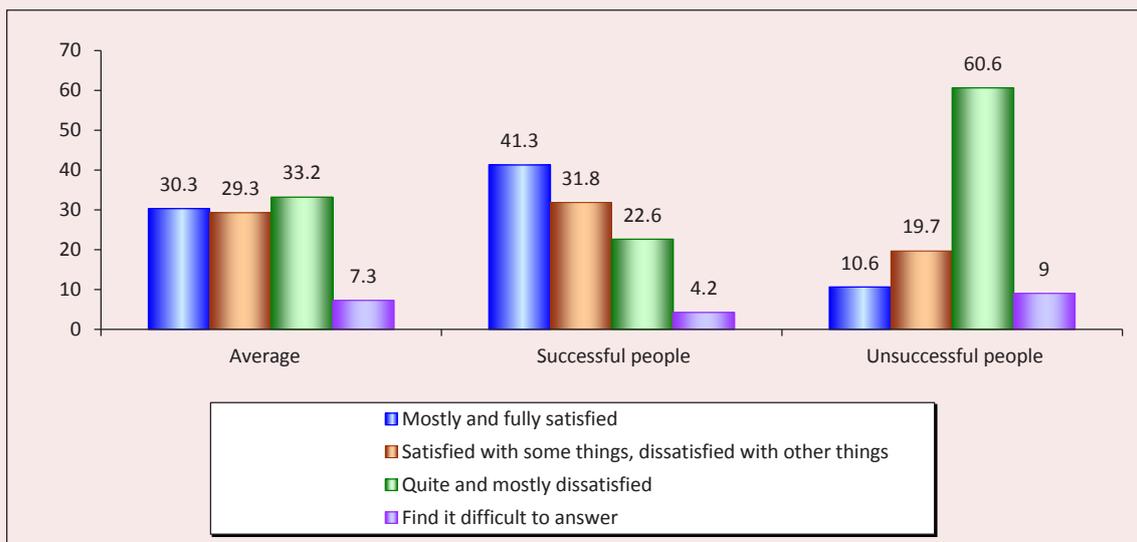
Source: data from a pilot survey of the population of the cities of Russia (Vologda, Cherepovets, Petrozavodsk, Kolomna), Belarus (Minsk) and Poland (Lublin), 2018.

Table 1. Extent of using one's qualities and skills in work and life, %

Qualities	Groups according to self-assessment of successfulness	Degree of use of qualities			
		Very little (at a minimum)	Partly (little)	More or less fully (I can do more)	Fully (at the limit)
Physical capabilities and health	Successful	4.6	17.5	46.4	31.5
	Unsuccessful	7.5	23.3	41.7	27.5
Psychological stability	Successful	0.4	12.2	46.6	40.9
	Unsuccessful	5.1	19.5	43.2	32.2
Knowledge, erudition, qualification	Successful	1.1	8.3	49.5	41.2
	Unsuccessful	17.1	24.8	33.3	24.8
Creative abilities (ingenuity, ability to solve previously unknown tasks, etc.)	Successful	9.3	18.6	43.4	28.7
	Unsuccessful	26.5	26.5	29.9	17.1
Sociability, ability to get along with people	Successful	1.4	7.5	45	46.1
	Unsuccessful	4.2	20	36.7	39.2
General culture (good manners, politeness, restraint, etc.)	Successful	1.8	4.7	45.9	47.7
	Unsuccessful	5.9	7.6	42.4	44.1
Moral qualities (honesty, sense of duty, decency, obligation, etc.)	Successful	1.1	4.3	37.7	56.9
	Unsuccessful	2.5	5.8	43.3	48.3
Striving for promotion, showing initiative and enterprise	Successful	11.8	24.3	40	23.9
	Unsuccessful	28.6	33.6	34.5	3.4
Source: data from a pilot survey of the population of the cities of Russia (Vologda, Cherepovets, Petrozavodsk, Kolomna), Belarus (Minsk) and Poland (Lublin), 2018.					

Table 2. Balance of personal life and work, %

Personal life	%	%	Work
Satisfaction with one's life in general			**Satisfaction with professional activities**
Average for the survey	57.7	53.7	*Average for the survey*
Average for a successful group of working parents	73.8	78.5	*Average for a successful group of working parents*
Assessment of life prospects			**Assessment of career prospects** *(over the past 5 years, the official position has improved)*
Average for the survey	28.0	38.6	*Average for the survey*
Average for a successful group of working parents	34.9	43.0	*Average for a successful group of working parents*
Family influence on life satisfaction *(increase satisfaction)*			**Influence of the family on career plans** *(I had to give up my family plans for a career)*
Average for the survey	62.2	8.1	*Average for the survey*
Average for a successful group of working parents	76.2	9.9	*Average for a successful group of working parents*
Source: data from the pilot survey of the population of cities in Russia (Vologda, Cherepovets, Petrozavodsk, Kolomna), Belarus (Minsk) and Poland (Lublin), 2018.			

(Tab. 2). At the same time, "successful" working parents show a significantly higher degree of satisfaction with both aspects.

Results of personal successfulness block

The study of the emotional profile of "successful" people (57.6% of respondents) shows that all the studied positive emotions are expressed to a greater degree, compared with "unsuccessful" people. But the emotion "happiness" was the most sensitive: according to this indicator, the largest differences between the answers of "successful" and "unsuccessful" respondents were recorded (the difference was 31.2 percentage points), which indicates a possible strong correlation between the indicators "successfulness" and "happiness" *(Fig. 10)*.

More than half of respondents (57.7%) are "completely" or "rather satisfied" with their life. At the same time, 22% are unequivocally

Figure 10. Emotional profile of successful and unsuccessful people, %
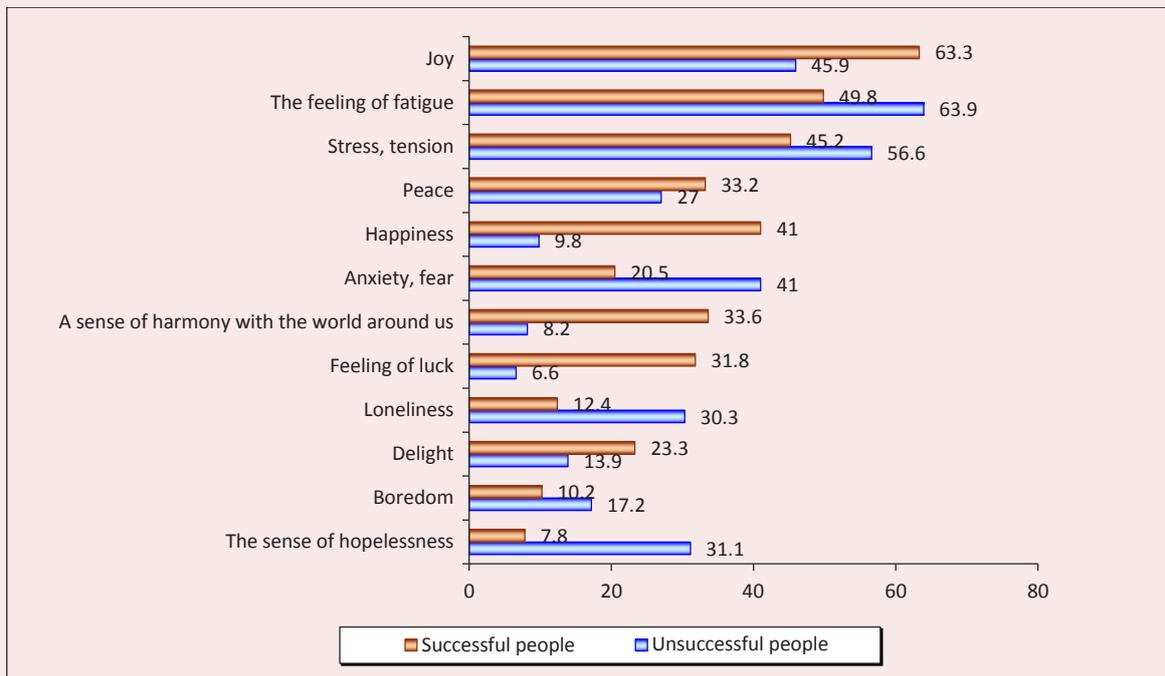
Source: data from the pilot survey of the population of the cities of Russia (Vologda, Cherepovets, Petrozavodsk, Kolomna), Belarus (Minsk) and Poland (Lublin), 2018.

Figure 11. Assessment of life satisfaction, %
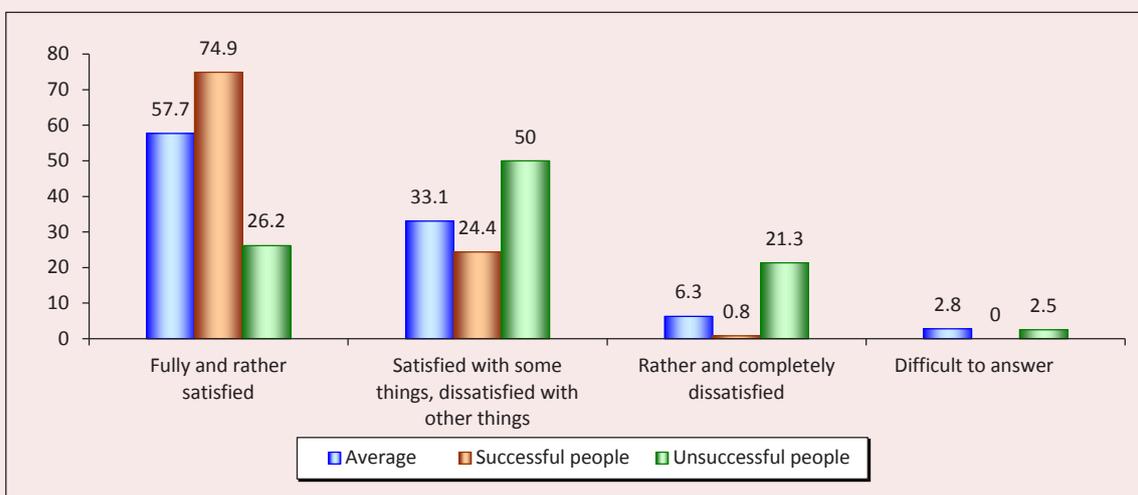
Source: data from the pilot survey of the population of the cities of Russia (Vologda, Cherepovets, Petrozavodsk, Kolomna), Belarus (Minsk) and Poland (Lublin), 2018.

sure of this. Among the "successful" people, positive ratings prevailed at all points of the survey *(Fig. 11)*. On average, optimists in the group of "successful" more than three times compared to the opposite group. Among the "unsuccessful" people there are almost two times more those who expressed their dissatisfaction with life.

We should note that the results presented in the article are analyzed only from the point of view of checking the relevance of the tools on the basis of successfulness and understanding of the survey methodology. Cross-country comparison requires both a larger study and adjustment of methodological and organizational tasks related to the substantiation of the principle of choice of research points (typology of countries, the greatest differences or the greatest similarity [73]). Undoubtedly, the available data require further in-depth analysis.

Conclusion

The results of the pilot study have confirmed the relevance and adequacy of methodological tools. The analysis of the data has shown that the results do not contain contradictions and are consistent with the theoretical and methodological foundations of the study.

Scientific importance of the research consists in the study of latent aspects and contradictions of success, its correlation with the system of values of a particular society and prospects for its development.

We note that these findings are only part of the research project. Achievement motivation and the pursuit of success are only one type of work and life motivation. The results of its implementation in specific activities can be contradictory and ambiguous. This is confirmed by a number of researchers, which have already been mentioned earlier ("payment for success", "fear of success"). The task is to investigate these aspects more deeply, and in the future to study the prevalence of achievement motivation in specific social groups, territorial and cross-country context.

In addition, the understanding of success and successfulness at different stages of life is changing. From a managerial point of view, it is important not only to understand success for a certain age and generation, but also to create conditions for successfulness for all ages. This is seen as deepening the study. In the next stages of the project it is planned to analyze the categories of "successfulness" and "life satisfaction" in terms of gender and generational aspects, more detailed individual characteristics of successful people and external drivers of success, focusing on the dominant factors (including age) that affect the overall satisfaction of the individual. Also, with the increase in the research field, a cross-country comparative analysis will be conducted on the most informative indicators.

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SOCIO-ECONOMIC DEVELOPMENT STRATEGY

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Research Potential of the Ural Branch of the Russian Academy of Sciences as a Strategic Factor in Regional Development*

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Abstract. The article brings to the fore the issues related to identifying and assessing the relationship between the development of the research sector and the innovative growth of regions. It is shown that the key feature of the knowledge generation sector is research potential, the essence of which is directly related to the level of development of fundamental and applied research, the degree of their implementation in the material sector of the economy. We reveal that at present the research is carried out, which affects various aspects of the assessment of research potential, identifying the trends in its development and mechanisms of its implementation at different levels. The comparative analysis carried out in the article shows that all methodological approaches include a fairly identical set of indicators characterizing quantitative characteristics and their dynamics; many of them use aggregated indices that make it possible to compare countries and regions. In addition to the existing methods, our own approach proposes to analyze not only quantitative, but also qualitative characteristics in order to create conditions for the formation of the environment for innovative development of the region. Thus, on the example of the Ural Branch of the Russian Academy of Sciences we show that the priority directions of research development should not only correspond to the global and national scientific agenda, but also address the issues of innovative development of the regions in which research centers are located. The article presents the analysis of the regions in which scientific institutes and centers of the Ural Branch of RAS are located; we make a classification of these regions, highlighting the regions-innovators, regions-followers and catching up regions; priorities of innovation and technological development are identified for each region and then they are compared with the priorities of the Ural Branch of RAS. We put forward the thesis that in addition to the concentration of researchers the most important condition for the generation of knowledge and for the creation of breakthrough technologies is a high concentration of investment resources in the field of science. On the example of the Ural Branch of the Russian Academy of Sciences we present the data on the need for investment in the development of scientific organizations and scenarios for their development.

Key words: research potential; factors in the development of the region; Ural Branch of RAS.

Introduction

The innovative development scenario for Russia is non-alternative: it has been repeatedly proved by scientists and economists, and it is enshrined in federal and regional legal acts. The implementation of this scenario should ensure a high level of the domestic economy's competitiveness in the world. Usually, researchers identify a number of characteristics natural for an economic innovation model. Among them, the key ones are the high level and quality of human capital, significant investments in its development, well-organized and effectively functioning innovation systems, an attractive investment climate, and a high share of high-tech sectors in the structure of the economy. Moreover, the most important component is the *research potential of the economy*, the content of which is associated with a high level of fundamental science development, significant rates of implementation of applied science's results, the presence of major scientific centers. It is generally accepted that the efficient functioning of the innovative model of economic development is impossible without a proper development level of the scientific sphere. Research potential plays a key role in this context for current and future innovative development[1].

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[1] Savinkov V.I., Baklanov P.A. *Rol' nauki v razvitii innovatsionnogo proizvodstva: ekspertnaya otsenka*. TsSPiM, 2016. 140 p.

The role of science in the process of the innovative environment shaping is often reviewed from completely different positions. Each point of view highlights and considers a specific feature. Thus, according to some interpretations of the research potential, the emphasis is put on the content of the concept, according to others – on its functionality, according to some more – on the characteristics of relationships with other economic sectors[2], etc. It seems appropriate to justify the methodological choice for objectives of this study without conducting a detailed analysis of all existing concepts.

Many researchers use a general and broad concept of *"intellectual potential"*. They understand it as scientific knowledge in general, which includes knowledge embodied in the results of intellectual activity (technologies, patents, etc.), knowledge which has a significant informational nature (publications), and knowledge which is inseparable from a person. From this point of view, the assessment of intellectual capital is given by the OECD: it separately considers the level of educational potential and the level of development of scientific research[3]. In this sense, intellectual potential characterizes the ability of a country (region) to create new knowledge and technologies for its socio-economic development[4].

The term "*educational scientific potential*" is quite close to intellectual potential. It is usually understood as a set of educational, scientific, scientific and educational country's institutions. Spatial structure of scientific and educational

potential plays a key role in the formation of policy of "regional inequality" alignment. It becomes a major factor of strengthening regional competitive advantages through the formation and development of human capital, creation of regional scientific and educational infrastructure, institutional environment of the regional innovation system. This concept is closely related to activities specified in national "Science" project on creation of regional networks of scientific and educational centers.

The term "*scientific and technical potential*" is one more concept reviewing the knowledge generation sphere from the position of technology creation. Thus, according to some researchers, scientific and technical potential is the "unity of two primary characteristics: 1) the totality of resources related to the scientific and technical sphere; 2) effectiveness of functioning, especially in terms of impact on the economy and society as a whole"[5]. Another opinion connects the scientific and technical potential with "the totality of human, material, financial and informational resources available to the national "science-technology" sphere and organizational and managerial structures that ensure the functioning of this sphere"[6]. Literally, scientific and technical potential is a complex system that includes scientific (research and development), educational, and technical potential. A number of researchers review scientific and technical potential very narrowly: as the result of research and development, defined by the quantity of scientific and technical information; as the result of scientific activities and studies' types which are directly related to the creation of

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[6] Avdulov A.N., Kul'kin A.M. Indicators of scientific and technical potential. Methods of comparative analysis. *Kur'er rossiiskoi akademicheskoi nauki i vysshei shkoly=Courier of Russian Academic Science and Higher Education*, 2001, no. 12.

new technology and the development of new scientific and technical projects, programs[7,8].

The imposition of research potential on the sphere of innovative products manufacturing leads to the emergence of the "*innovative potential*" concept. It is the result of the transformation of scientific knowledge into new types of products and services[9], organizational, managerial, and financial mechanisms[10] aimed at creation of multiplicative innovations[11]. An integral part of the innovative potential is an array of scientific and technical developments, inventions necessary for the formation of accelerated growth of innovative products' manufacturing. Mechanisms of formation and use of innovative potential are directly connected with the increase of quality level and demand of R & D, the improvement of cooperation between industrial enterprises and organizations of fundamental and branch science, the formation of an intellectual property market[12].

We focus on "*research potential*" which we understand as the totality of scientific knowledge, results of fundamental and applied

scientific research obtained at different stages of the scientific and technical cycle. Research potential, being part of scientific and technical potential, is focused on early stages of the scale of technology readiness, connected with *fundamental and applied studies,* which include "approval and publication of basic technological principles; formulation of the technology concept and evaluation of the application scope; start of research and development, confirmation of characteristics; verification of main technological components in the laboratory; verification of main technological components in real environment»[13]. Respectively, *drivers of the research potential formation are scientific organizations that carry out fundamental and applied studies.*

As mentioned earlier, usually, in publications, research potential is not allocated to an independent category with a corresponding definition and a set of characteristics, but it is included, as an integral element, in scientific and technical potential. At the same time, research potential is the basis for the development of scientific and technical, innovative potential in the country and on the regional level. It ensures the competitiveness of produced goods and services[14]. Identification and evaluation of research potential are justified by the purpose of this article, which is

[7] Mindeli L.E., Khromov G.S. *Research and technical potential of Russia.* Moscow: TsISN, 2003, 122 p.

[8] Zadumkin K.A., Kondakov I.A. *Scientific and technical potential of the region: Assessment of the state and prospects of development.* Vologda: ISEDT RAS, 2010, 205 p.

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[11] Akberdina V.V., Grebenkin A.V., Bukhvalov N.Y. Simulation of innovative resonance in the industrial regions. *Ekonomika regiona=Economy of Region*, 2015, no. 4, pp. 289–308. DOI: 10.17059/2015-4-23

[12] Solov'ev D.B., Kuzora S.S. Methodology for evaluating innovation activity by means of flexible algorithms. *Innovatsii=Innovations*, 2019, no. 6, pp. 12–24.

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[14] Bendikov M.A., Khrustalev E.Yu. Methodological bases of research of the mechanism of innovative development in modern economy. *Menedzhment v Rossii i za rubezhom=Management in Russia and abroad*, 2007, no. 2, pp. 314.

to show the role of organizations, performing research and development, in the innovative development of regions and countries.

Country's research potential is spatially distributed, and its formation is primarily connected with a functional role in regional development. It is the regional level of innovative systems that ensures the absorption of technological knowledge[15], forms the susceptibility of innovation by industries, multiplicatively increases the production of innovative products[16]. Region's research potential has a paramount importance for achieving a given level of innovative development of the regional socio-economic system, corresponding to the tasks of post-industrial development. It also acts as a powerful non-material factor of region's innovative environment, the formation and development of which is largely provided by the usage of fundamental and applied science's achievements.

In this regard, *the article aims* to emphasize the key role of regional science in the innovative and socio-economic development of regions, connected, on the one hand, with the solution of regional problems, and, on the other hand, with inclusion in global scientific agenda, which ensures region's competitiveness in global economy.

Research methodology and justification of its choice

There is no independent system of indicators of research potential assessment in *international practice*. Usually, research potential is included in the composite index of innovative development. Methods for evaluating indicators that allow assessing the level of development of the innovative potential of the economy (as well as its individual components) are quite diverse. The Organization for Economic Cooperation and Development (OECD), which proposed the Declaration on Science, Technology, and Innovation Policies for the Global and Digital Age[17] in 2015, is the legislator for the assessment and monitoring of scientific and innovative development. Meanwhile, other methods of comparison of scientific and innovative activity by composite indices, which allow a comprehensive assessment of an analyzed area, deserve attention. In particular, we are interested in the section of methods related to the assessment of research potential.

Thus, in global innovation index, calculated according to the methodology of International INSEAD business school, there is a block "Results of implementation of innovative transformations" which includes indicators of "development of technologies and knowledge economy" and the "results of creative activity"[18]. There is the block "results of innovative activity", which includes indicators of R&D effectiveness (R&D financing, publications, diffusion of knowledge, patents, etc.)[19], in the methodology of International innovative index of Boston consulting group. The European innovation index includes blocks "attractiveness

[15] Samovoleva S.A. Absorption of technological knowledge as a factor of innovative development. *Voprosy Ekonomiki=Economic Issues*, 2019, no. 11, pp. 150−158. https://doi.org/10.32609/0042-8736-2019-11-150-158

[16] Rumyantsev A.A. Scientific and innovative activity in the region as a factor of its sustainable economic development. *Ekonomicheskie i sotsial'nye peremeny: fakty, tendentsii, prognoz=Economic and Social Changes: Facts, Trends, Forecast*, 2018, vol. 11, no. 2, pp. 84−99. DOI: 10.15838/esc.2018.2.56.6

[17] Daejeon Declaration on Science, Technology, and Innovation Policies for the Global and Digital Age. https://www.oecd.org/sti/daejeon-declaration-2015.htm (accessed: 20.11.2019).

[18] Global Innovation Index 2019. https://www.wipo.int/publications/ru/details.jsp?id=4434&plang=RU (accessed: 20.11.2019).

[19] The innovation imperative of manufacturing. http://www.themanufacturinginstitute.org/~/media/6731673D21A64259B081AC8E083AE091.ashx (accessed: 20.11.2019).

of research infrastructure" (international scientific publications, publications in Q1 journals, share of foreign doctoral students) and "patent activity" (patent applications filed under the PCT, applications for trademarks, applications for industrial designs)[20]. The knowledge economy index is based on the assessment of economy's "knowledge intensity" and its relationship with long-term economic growth[21]. Similar sections are also presented in the calculation of the Innovation Capacity Index[22] and the Bloomberg Innovation Index[23].

Russian practice, usually, copies foreign approaches and evaluates the country and regions according to above-mentioned methods[24]. At the same time, there are separate methods for evaluating research potential in the fields of federal regulation (FSMNO)[25] and scientific community[26].

Most Russian and foreign methodologies have several limitations in the process of assessing region's research potential. Some of them are purely technical: they do not allow calculating individual indicators on the regional level. However, there are also fundamental problems: for example, the lack of assessment of research topics' relevance and its compliance with global or national scientific agenda, the lack of connection of research potential with indicators of regions' socio-economic development, the lack of evaluation of research cooperation and collaboration.

Our approach toward assessment of research potential allows consideration of above-mentioned aspects and clear justification of science's strategic role in the regional development. This approach also includes the comparison of indicators per researcher, not only the analysis of absolute indicators. It lets us comparatively analyze regions with each other and notice deviations from best regions (benchmarks) and average Russian values.

Characteristics of studies' object and data sources

The object of the article's research is *research potential of Ural Branch of RAS*. Today it is a powerful multi-industry research complex, which has 33 scientific organizations, a number of universities, the largest scientific library in the Urals, design, technology, engineering centers, and a network of hospitals under its scientific and methodological guidance. Academic research organizations are situated in Yekaterinburg, Syktyvkar, Izhevsk, Perm, Chelyabinsk, Arkhangelsk, and Orenburg. They include more than 3700 scientists, almost 750 doctors, and more than

[20] European innovation scoreboard. https://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards_en (accessed: 20.11.2019).

[21] EBRD Knowledge Economy Index. https://www.ebrd.com/news/publications/brochures/ebrd-knowledge-economy-index.html (accessed: 20.11.2019).

[22] The Innovation Capacity Index: Factors, Policies, and Institutions Driving Country Innovation. https://www.researchgate.net/publication/280051943_The_Innovation_Capacity_Index_Factors_Policies_and_Institutions_Driving_Country_Innovation (accessed: 20.11.2019).

[23] The Bloomberg Innovation Index. https://www.bloomberg.com/graphics/2015-innovative-countries/ (accessed: 20.11.2019).

[24] Fedorova E.V. Foreign methods of countries and regions' innovation activity rating. *Infrastrukturnye otrasli ekonomiki: problemy i perspektivy razvitiya=Infrastructural Sectors of the Economy: Problems and Prospects of Development*, 2013, no. 1, pp. 95−107.

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2000 candidates of sciences. Researchers under the age of 39 make up 42% from the number of all researchers. 36 academicians and 67 corresponding members of the Russian Academy of Sciences supervise studies in the most important scientific areas. Every year, researchers prepare more than 4 thousand publications (*Fig. 1*). There is a doctorate, and the post-graduate school trains students in 83 specialties.

More than a half of the scientific output of the Ural region is created in academic institutions under the scientific and methodological guidance of the Ural Branch of the Russian Academy of Sciences. These organizations are popular scientific complexes, the volume of research and development of which increases every year (*Fig. 2*). The educational segment in the institutes of Ural Branch of RAS develops quite dynamically.

Figure 1. Dynamics of publishing activity of institutes of Ural Branch of RAS
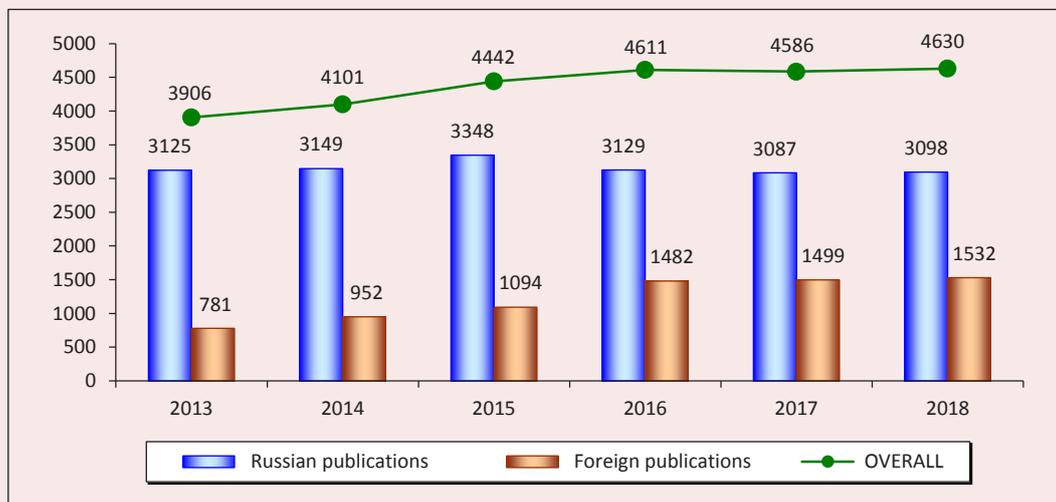
Source: Ural territorial administration of the Ministry of Science and Higher Education of the Russian Federation.

Figure 2. Dynamics of research and development extent of institutes of the Ural Branch of RAS, million rubles
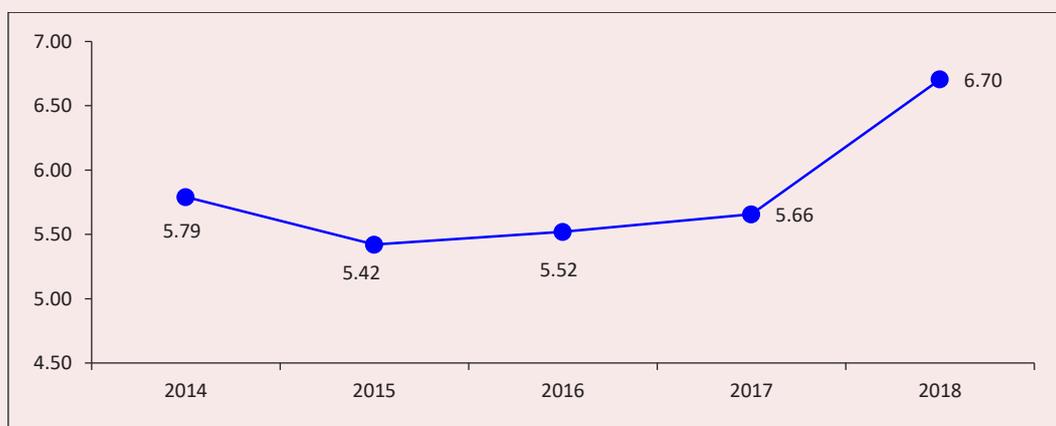
Source: Ural territorial administration of the Ministry of Science and Higher Education of the Russian Federation.

Figure 3. Dynamics of labor productivity of the Ural RAS institutes, thousand rubles

Source: Ural territorial administration of the Ministry of Science and Higher Education of the Russian Federation.

Thus, from 2014 to 2018, the volume of educational services (post-graduate studies) has increased by 2 times.

The dynamics of labor productivity (the ratio of the financial performance of a scientific organization by type of work performed and services rendered to the average number of employees) in the institutes of the Ural Branch of RAS constantly increases. At the end of 2018, it was just over 1 million rubles per employee (*Fig. 3*).

The largest share in the volume of financial performance of organizations of Ural Branch of RAS is occupied by institutions located in Yekaterinburg. They account for 52.6% of government tasks funding, 55.2% of researchers' number and almost 60% of scientists under the age of 39.

In order to unite research potential of academic institutes under scientific and methodological management of Ural Branch of RAS, the complex system of federal research centers (FRC) was formed: Federal Center for Integrated Arctic Research of the Russian Academy of Sciences named after academician N.P. Laverov, Perm Federal Research Center of the Ural Branch of RAS, Udmurt FRC of UB RAS, Komi FRC of UB RAS, Orenburg FRC of UB RAS, South Urals FRC of Mineralogy and Geoecology of UB RAS, Ural Federal Agricultural Research Center of UB RAS.

Scientific institutions of the Ural Branch of the Russian Academy of Sciences conduct fundamental and problem-oriented studies aimed at the implementation of critical technologies, included in federal target programs, Presidium programs, grants from domestic and foreign funds (*Fig. 4*). Many scientific and practical developments are carried out together with universities, sectoral institutes, industrial enterprises, military-industrial organizations.

Main areas of research are related to theoretical and applied mathematics and mechanics, control processes, solid state physics and chemistry, electro- and thermos-physics, thermal engineering, integrated engineering, theory of metallurgical processes, high temperature electrochemistry, synthetic organic chemistry, population ecology, immunology, genetics, an integrated study of plant, animals, water, and soil resources, geological study of the territory,

Figure 4. Research areas of the Ural Branch of RAS

PRIORITIES OF THE STRATEGY OF SCIENTIFIC AND TECHNOLOGICAL DEVELOPMENT OF RUSSIA

DIGITAL TECHNOLOGY
- Robotic systems
- New materials and construction methods
- Big data processing systems
- Machine learning and artificial intelligence

GREEN TECHNOLOGY
- Clean energy
- Efficient extraction and deep processing of hydrocarbons
- New energy sources
- New ways to transport and store energy

MEDICINE
- Personalized medicine
- High-tech healthcare
- Health-saving technologies
- Rational use of medicines

AQUA- AND AGRICULTURE
- Highly productive and environmentally friendly agriculture
- Rational use of plant and animal protection products
- Efficient processing of agricultural products
- Safe and quality food

SECURITY
- Counteraction to technogenic and biogenic threats
- Counteraction to terrorism and ideological extremism
- Counteraction to cyber threats

CONNECTIVITY OF TERRITORIES
- Intelligent transport system
- Intelligent telecom. systems
- Development of air and space
- Development of the World Ocean, Arctic and Antarctic

HUMAN
- Cooperation between man and nature
- Cooperation between man and technologies
- Cooperation between social institutes

RESEARCH AREAS OF THE URAL BRANCH OF RAS

- Theoretical and applied mathematics and mechanics, control processes
- Solid state physics and chemistry
- Electro-and thermophysics, heat power engineering
- Complex problems of mechanical engineering
- Theory of metallurgical processes
- High-temperature electrochemistry
- Synthetic organic chemistry
- Environmental management
- Comprehensive study of plant, animal, water and soil resources
- Immunology, genetics
- Population ecology
- Complex of human and social sciences

RESEARCH POTENTIAL OF URAL BRANCH OF RAS

- 38 academic institutions
- the largest scientific library in the Urals
- design-technological and engineering centers, network of hospitals
- 3700 researchers, including almost 750 doctors and more than 2000 candidates of sciences
- 36 academicians and 67 corresponding members of RAS
- 83 specialties of postgraduate studies

the identification of mineral deposits and establishment of foundations of rational nature management, development of mineral resources, the complex of sciences on man and society. Formation of directions is caused by peculiarities of historical academic science development in the Urals and needs of one of the largest industrial regions.

Historically organized areas of scientific studies of the Ural Branch of Russian Academy of Sciences *fully correspond to the priority directions of Russian scientific-technological and social development and meet the needs of country's largest industrial regions*: first and foremost, regions with scientific centers of UB RAS.

We used data from the Ural territorial administration of the Ministry of Science and Higher Education of the Russian Federation and the Federal state statistics service for assessing the research potential of the Ural Branch of RAS, and its impact on socio-economic development of the regions of its presence.

Results of the research

Scientific institutions and departments of the Ural Branch of RAS are situated on the territory of *three federal districts of the Russian Federation* (Ural, Volga, and Northwestern), *two economic regions* (Northern and Ural), *two republics* (Udmurt and Komi), one krai (Perm), and five oblasts (Sverdlovsk, Chelyabinsk, Orenburg, Arkhangelsk, and Kurgan). Ural RAS organizations are situated on territories of so-called *middle regions,* which serve as indicators of country's socio-economic development in spatial aspect at the expense of network inter-territorial and global cooperation. It also determines strategic scientific status of the Ural Branch of RAS as the center of scientific studies coordination, including interdisciplinary.

On the one hand, the prospective development of scientific research in the Ural RAS should meet the needs of regions where the Department's scientific organizations are located. On the other hand, the search work should not be limited by regional orientation but should include the study of general laws of nature and society development that are important for Russian and global science.

Regions with scientific institutes of Ural RAS are industrial Russian territories, which have unique natural resource potential in terms of reserves and diversity, a developed industrial complex, powerful, although unevenly developed, transport and energy infrastructures, a high export potential of its products, qualified labor resources, extensive network of educational and research centers. The regions are extremely rich in various minerals, national importance have ferrous and nonferrous metallurgy, manufacture of machinery, equipment and technology a wide spectrum (from the shopping and transport equipment to construction equipment, drilling and metallurgical plants, chemical equipment, electronics and automation, nuclear power), chemical production, mining of minerals, harvesting and processing of wood. The regions are extremely rich in various minerals: ferrous and non-ferrous metallurgy, manufacture of machinery, a wide spectrum of equipment and technology (from the shopping and transport equipment to construction equipment, drilling and metallurgical plants, chemical equipment, electronics and automation, nuclear power), chemical production, mining of minerals, harvesting and processing of wood have national importance.

Regions with the Ural RAS scientific institutions are extremely heterogeneous in terms of scientific status, innovation activity, and economic structure.

Regions-innovators are quite clear: Sverdlovsk and Chelyabinsk oblasts, Perm krai. These regions significantly differ from other entities in terms of internal expenditures on research and development: in absolute terms and in GRP percentage (*Fig. 5, 6*).

Figure 5. R&D expenditures in regions with research centers of the Ural Branch of RAS in 2018, billion rubles
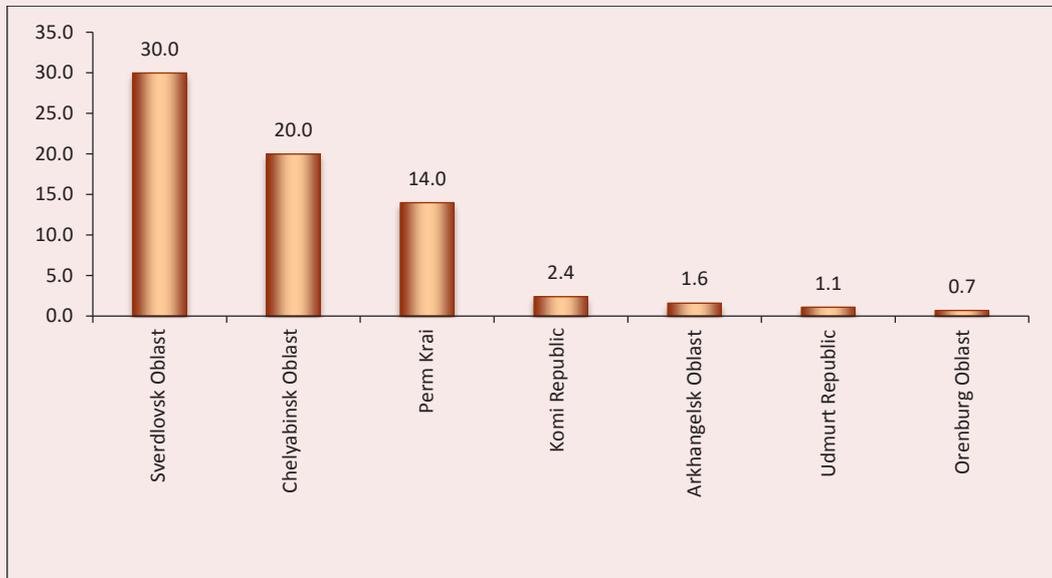
Source: Russian regions. Main characteristics of entities of the Russian Federation-2018: stat. coll. Federal State Statistics Service. Available at: https://gks.ru/bgd/regl/b18_14s/Main.htm (accessed: 20.11.2019).

Figure 6. Expenditures in regions with research centers of the Ural Branch of RAS in 2018, in % to GRP
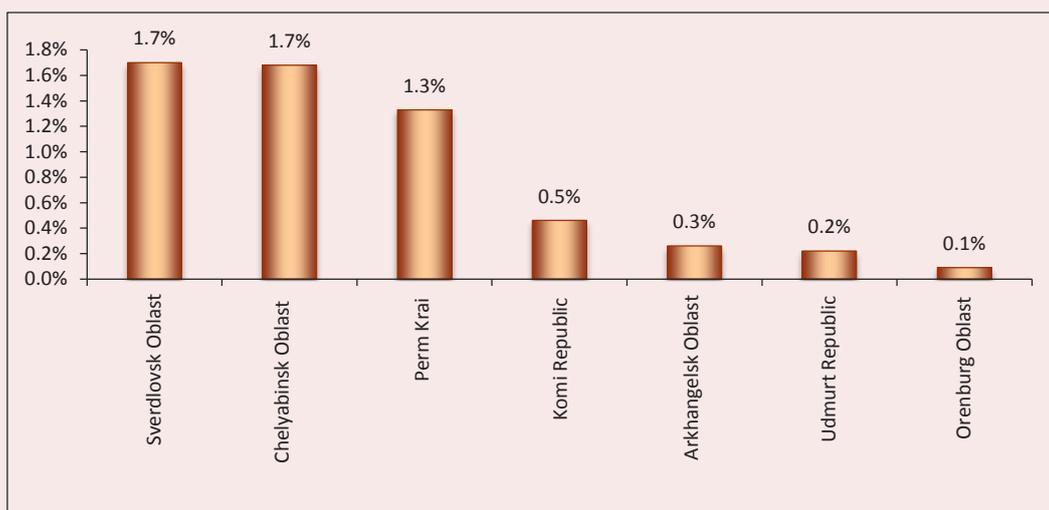
Source: Russian regions. Main characteristics of entities of the Russian Federation – 2018: stat. coll. Federal State Statistics Service. Available at: https://gks.ru/bgd/regl/b18_14s/Main.htm (accessed: 20.11.2019).

Figure 7. Volume of innovative products in regions with research centers
of the Ural Branch of RAS in 2018, billion rubles
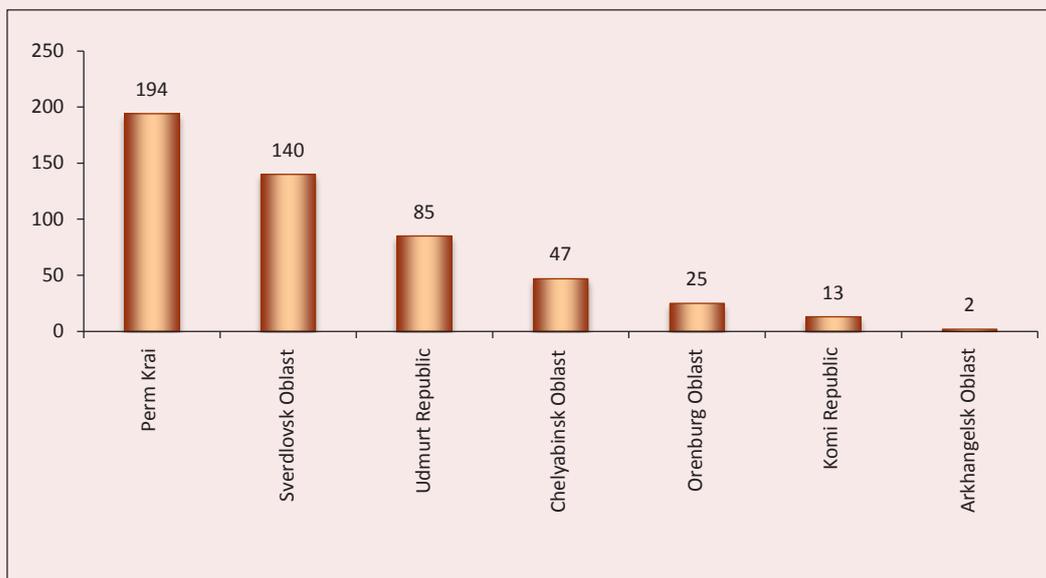
Source: Russian regions. Main characteristics of entities of the Russian Federation – 2018: stat. coll. Federal State Statistics Service. Available at: https://gks.ru/bgd/regl/b18_14s/Main.htm (accessed: 20.11.2019).

Figure 8. The share of products of high-tech and knowledge-intensive industries in GRP, %
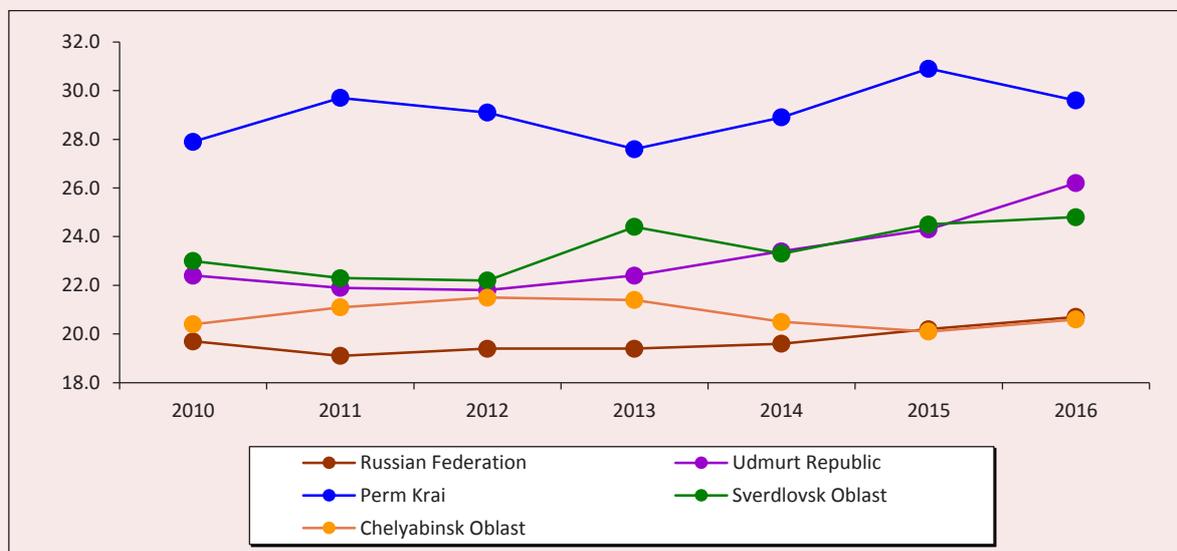
Source: Russian regions. Main characteristics of entities of the Russian Federation – 2018: stat. coll. Federal State Statistics Service. Available at: https://gks.ru/bgd/regl/b18_14s/Main.htm (accessed: 20.11.2019).

The volume of shipment of innovative products is also significant (*Fig. 7, 8*). It is related to a large share of high-tech sector in these regions, which, primarily, include mechanical engineering, chemical and pharmaceutical industry, energy, and military-industrial complex. Thus, foreground studies in regional Ural RAS scientific divisions depend on priorities of their technological development:

– in the Sverdlovsk Oblast – the development of informational technologies (computing resources, storage and transmission of information), alternative sources of energy, energy saving, resource-saving and environmentally friendly technologies for mining and deep processing of mineral and man-made raw materials, materials science, organic synthesis, development of new materials, technologies of mechanical engineering, instrumentation, chemical industry, development of high-tech agricultural production, etc.;

– in the Chelyabinsk Oblast – scientific support of priority areas of technological development (rocket and space technology, nuclear power, instrument-making), new technologies for the synthesis of inorganic materials, strengthening of raw material base for mining and metallurgical industry;

– in Perm Krai – scientific support of oil and gas complex transition to new technologies for production and processing of fuel, increase of depth of raw materials processing in forest, chemical, and petrochemical industries, improvement of environmental friendliness in mentioned industries, development of high-tech machine-building products, construction of materials, and development of innovative infrastructure for creation and implementation of new biotechnologies in areas of environmental protection, industry, medicine, and agriculture.

Scientific research at the Ural RAS institutions, located in these regions, have their own unique directions and significant reserves for advancement in global scientific space.

The next group of regions is called "*regions-followers*", which differ in average values of scientific, technological, and innovative development. It includes Republics of Komi and Udmurtia, as well as the Arkhangelsk Oblast. Thus, research areas are more closely related to development needs of these regions: some areas have a global potential.

The Orenburg Oblast is one of *catching up regions* with low innovative activity. At the same time, there is an ongoing in-demand research on creating a network of seismic monitoring, development of new diagnostic and therapeutic technologies, and justification of geo-ecological basics of sustainable nature management in a steppe zone.

According to the Forecast of a long-term socio-economic development of the Russian Federation for the period up to 2030, the highest growth rate of GRP is projected in the Sverdlovsk (308%), Chelyabinsk (209%), and Tyumen (200%, without Autonomous okrugs) oblasts. It will be caused by the placement of new production facilities and expected high level of investment in southern regions of the Ural Federal district.

The commissioning of new fields in Yamalo-Nenets Autonomous Okrug will allow maintaining a fairly high rate of GRP growth (199%) up until 2030, but Khanty-Mansi Autonomous Okrug is expected to lose GRP: by 2030, the figure will have reached only 90% of 2011 level. Sverdlovsk (364%), Kurgan (306%), Tyumen (without Autonomous okrugs) (254%), and Chelyabinsk (200%) oblasts will be leaders of industrial growth in 2012–2030 period.

High rates of investment growth are caused by capital intensity of projects in extractive and infrastructure industries: they account for a

significant part of regional investments. Sverdlovsk (323%) and Chelyabinsk (223%) oblasts are leaders in terms of district's investment growth. However, according to absolute investment volumes, Yamalo-Nenets and Khanty-Mansi Autonomous okrugs prevail: major volume of Ural Federal District's investments will be send into these economies.

Table 1 presents separate indicators of regions' research potential with scientific centers of the Ural Branch of RAS. As mentioned earlier, scientific organizations are drivers of research potential. Main scientific organizations, which carried out research and development, are located in the Sverdlovsk oblast, Perm Krai, and the Chelyabinsk Oblast. These regions also lead in terms of research and development costs. At the same time, the Chelyabinsk Oblast, the Komi Republic, and the Orenburg Oblast are leaders in terms of budget funding share. At the same time, in terms of per capita indicators (per 1 employee who performed research and development), regions with a smaller number of researchers are in the lead (*Fig. 9*).

Table 2 shows normalized values of indicators included in author's methodology for assessing regional research potential. Normalization of indicators' values is based on the assessment of deviations from the national average. Sum up of deviations for eight indicators gives an integral assessment of the excess of indicators' values over Russian average value, on the basis of which regions are grouped into regions-innovators, regions-followers, catching up regions.

In 2019, the Comprehensive plan of development of the Ural Branch of RAS up to 2025 was developed and approved. It states *the mission of the Ural Branch of RAS*: fundamental knowledge and highly qualified personnel for innovative development of the Urals, adjacent regions, and Russia.

In May of 2018, *aims and objectives of national "Science"* project were defined by the President's Decree "On National Goals and Strategic Objectives of the Russian Federation through to 2024". A Comprehensive plan (Strategy) for the development of the Ural branch of RAS until 2025 will be implemented in this period. The national project "Science" sets clear, specific, and measurable goals, which are certainly reflected in the Strategy of Ural Branch of RAS.

According to the "Science" national project, by 2024, Russia should be among top five countries with best results in scientific studies. The country should also attract researchers to work in Russia and increase R&D finding at the expense of all sources.

According to this, *the aim of the Ural Branch of RAS* development is to take scientific research to global level and integrate academic science into the system of innovative renewal of the Ural and Russian economies.

Achievement of stated task will become possible due to completion of strategic tasks (*Fig. 10*). *The Ural department clearly divides strategic tasks concerning the development of presence regions and strategic tasks concerning the development of internal environment of the Ural department. Strategic* objectives of the Ural department development correlate with the objectives of the national "Science" project.

On the basis of goals and objectives of the Comprehensive plan for the period until 2025, taking into account clear objectives and specific target parameters articulated in the Russian President's May decree, Strategy of scientific and technological development of Russia, federal projects within national project "Science", the state program of the Russian Federation "Development of industry and increase of its competitiveness", and focus on directions of scientific-technological and industrial development of the Ural region

Table 1. Key performance indicators of organizations that conducted
research and development, January – June, 2019

Indicators	Value in the best RF region*	RF average*	Komi Republic	Arkhangelsk Oblast	Udmurt Republic	Perm Krai	Orenburg Oblast	Sverdlovsk Oblast	Chelyabinsk Oblast
Number of organizations that carried out research and development, units	157	74	24	36	28	59	25	99	53
Research and development costs – total, million rubles	14864	978.1	820.8	614. 5	1231.1	9357.4	386.0	13479	11238
internal	12478	792.2	812.9	610.7	1184.3	8119.3	378.9	11576	10399
external	2386	185.9	7.9	3.7	46.8	1238.2	7.1	1902.9	838.9
Internal expenses for research and development at the expense of the federal budget, million rubles.	12954	953.7	526.2	203.9	198.9	2746.6	224.5	3063.8	8610.4
*Not including Moscow, Saint Petersburg, the Moscow and Leningrad oblasts.									

Table 2. Normalized values of indicators included in the assessment of the region's research potential

Indicators	Sverdlovsk Oblast	Chelyabinsk Oblast	Perm Krai	Komi Republic	Arkhangelsk Oblast	Udmurt Republic	Orenburg Oblast
Expenditure on research and development per 1 researcher	0.8899	0.8735	1.1339	0.6316	0.7301	0.7562	0.4778
Salary fund per 1 researcher	0.6788	0.8424	0.7662	1.2257	0.3482	0.6584	0.2791
Internal costs for research and development at the expense of the federal budget per 1 researcher	0.5262	1.7408	0.8656	1.0530	0.6303	0.3178	0.7228
Share of budget financing	1.5912	1.9928	0.7634	1.6673	0.8633	0.4202	1.5127
Share of innovative products	1.0615	0.9538	2.8308	0.1846	0.8615	1.9385	0.4923
Patents for inventions per 1 researcher	1.6806	0.4796	1.1101	0.8500	0.4009	1.9033	0.4000
Developed technologies per 1 researcher	1.9833	2.9000	1.7129	0.2719	2.5192	1.9536	0.4374
GRP per capita	1.1703	0.7556	0.8884	1.3310	1.2558	0.7195	0.8132
Amount of variance	**9.5819**	**10.539**	**10.071**	**7.2152**	**7.6092**	**8.6674**	**5.1353**
Type of region	**Regions-innovators**			**Regions-followers**			**Catching up regions**

Figure 9. Normalized values of indicators of the research sector development in regions of the Ural Branch of RAS

Figure 10. Purpose and strategic objectives of the Ural Branch of RAS development

FEDERAL GOALS AND OBJECTIVES:
Strategy of scientific and technological development of the Russian Federation, national project "Science"

REGIONAL GOALS AND OBJECTIVES:
Development strategies for regions where the Ural branch operates, regional industry strategies, and regional innovation strategies

THE PURPOSE OF THE DEVELOPMENT OF THE URAL BRANCH OF RAS: to bring scientific research to the global level and to include academic science into the system of innovative renewal of the Ural economy through the transition to new technological structures

Strategic development objectives corresponding to the development objectives of the regions where the Ural Branch operates

Strategic objectives on the development of the internal environment of the Ural Branch

1. Advancement of high-demanded technologies for the development of the economy and industry of the Ural region, corresponding to the priorities of the Russian scientific and technological development strategy

2. Formation of interdisciplinary technology centers that serve as a technological link connecting scientific research and implementation of its results in industrial technologies

3. Development of the scientific and innovative system of the Urals on the basis of integration of science, education, and high-tech economic sector

1. Achievement of leading positions and global level of fundamental research in a number of priority areas of science and technology

2. Modernization of the scientific and technical base of research, expansion of scientific equipment

3. Development of scientific schools, formation of a balanced staff, training of highly qualified personnel

4. Development of the social sphere to ensure a decent standard of living for scientists

and neighboring regions, the authors justified *6 priority directions of development of the Ural Branch of RAS*:

1. Digitalization of industrial enterprises.

2. Creation of new industrial technologies and materials.

3. Development of "green" technologies and security.

4. Improvement of demography and public health.

5. Comprehensive development of Arctic territories.

6. Socio-humanitarian technologies.

Socio-humanitarian technologies are organic components of these priorities. They provide an effective response to society's "big challenges", consider the cooperation between man and nature, people and technologies, social institutions at the current stage of global development, and apply methods of Humanities and Social Sciences.

Priorities of the Ural Branch of RAS are primarily defined by *long-term priorities of innovative and technological development of Ural and other regions with the Ural RAS scientific centers*, which are related to new industrialization implying increase in the share of economic high-tech sectors and innovative renewal of traditional industrial sectors.

Thus, "Creation of new industrial technologies and materials" is particularly important scientific area of the Ural RAS for industrial Urals. For example, even today, two Ural RAS regions-innovators are in the top 5 Russian regions according to the number of technologies used: Perm Krai and the Sverdlovsk Oblast — 12.4 thousand and 11.3 thousand technologies used in industries of respective regions in 2018.

The most significant results of the Ural RAS research institutes are in the following areas of high-tech industrial technologies: laser and plasma, functional coatings and surface treatment, magnetic materials for energy, magnetic nanostructures and materials / element base of nano-spintronics, devices and methods of non-destructive testing, precision metallurgy and pressure processing, digital modeling of materials, etc. Special attention should be paid to the possibility of industrial implementation of rapidly developing laser and plasma additive technologies and post-processing technologies of formed products, as well as technologies of obtaining different-grade powders (refractory, non-ferrous metals, wear-and corrosion-resistant alloys) used in additive technologies. In addition, the Strategy of socio-economic development of the Ural Federal District and the Russian Federation assigns a key role to the development of modern chemical technologies for the creation of promising organic materials for multi-purpose aims.

Broad and efficient participation of institutions, under scientific and methodical guidance of the Ural RAS, in creating and bringing of innovative technologies of goods and new materials' production and processing to industrial implementation is currently constrained by the lack of interinstitutional academic technology centers. An obvious competitive advantage of academic technology centers is the possibility of combining the efforts of the Ural RAS various institutes for creation of fundamentally new technologies by integrating individual technological elements, traditionally used in different fields of knowledge, into single fundamentally new end-to-end technologies, aimed at development of samples and experience batches of high-tech products, demanded in the real economic sector. Creation of a single infrastructure for areas which use technological chains with similar parameters will significantly reduce the cost of technological cycles. The project's

implementation will allow bringing the results of breakthrough developments in the field of new materials and technologies of the Ural RAS institutes to the stage of industrial production in interests of high-tech industries, the military-industrial complex, and for the purpose of import substitution. The project envisages the formation of a consortium that includes a number of the Ural RAS in-institutions of material science profile, located in Ekaterinburg, and a newly created Ural RAS Technology center of advanced materials: a separate technological building should be built for it.

The developed Comprehensive development plan for the Ural Branch of RAS includes an assessment of the total cost and several scenarios for its implementation.

The total cost of the Comprehensive development plan implementation of the Ural department of the Ural Branch of RAS is *63.6 billion rubles*. The largest area is "New technologies and materials", which accounts for 64.0% of costs (*Tab. 3*).

Total expenditure for the creation of interdisciplinary research centers is 53443.5 million rubles (84.0%), and 10188.6 million rubles (16.0%) are spent on fundamental and applied projects.

Among RF entities, territories of which have the Ural RAS scientific organizations (*Tab. 4*), the Sverdlovsk Oblast has the largest share — 53.2 billion rubles (83.6%).

Expected results of the Comprehensive development plan implementation are largely determined by *the financial model of providing planned innovative projects*.

The inertial scenario (1) will be implemented if the existing model of financing with the predominance of budget financing of programs and projects through the system of state tasks is maintained. The expected results for research and organizational activities will be in the range of 2–5% annual growth.

Table 3. Preliminary amount of expenses for the implementation of the Comprehensive development plan of the Ural Branch of RAS within scientific priorities

Scientific priorities of the Ural Branch of RAS	Expenses, million rubles
Digitalization of industrial enterprises	2 000.0
Creation of new industrial technologies and materials	40 751.4
Development of "green" technologies and security	6 696.5
Improvement of demography and public health	5 248.8
Comprehensive development of Arctic territories	1 763.5
Socio-humanitarian technologies	7 171.9
Total	**63 632.1**

Table 4. Preliminary amount of expenses for the implementation of the Comprehensive development plan of the Ural Branch of RAS within territories

Territory	Expenses, million rubles
Yekaterinburg, Sverdlovsk Oblast	53223.6
Perm, Perm Krai	5144.8
Syktyvkar, Komi Republic	3016.0
Arkhangelsk, Arkhangelsk Oblast	896.1
Izhevsk, Udmurt Republic	979.8
Orenburg, Orenburg Oblast	358.5
Chelyabinsk, Chelyabinsk Oblast	13.3
Total	**63 632.1**

The accelerated scenario (2) means an increase of research funding and the implementation of the Ural RAS most innovative projects. The indicators of publication, patent and innovation activity of the Ural RAS will grow by of 5−10% annually. At the same time, the source of increased funding will play a major role in this process. *With the growth of extra-budgetary financing at the expense of technology customers (2a)*, the accelerated scenario will be associated with a predominant increase of the studies' number and the volume of its implementation. *The accelerated scenario, due to the inclusion of Ural RAS in the "Science" national project (2b),* will lead to an increase of the basic studies' quality, their upbringing to the highest level, and simultaneous increase of applied studies for industrial customers.

The breakthrough scenario (3) will be implemented with a simultaneous increase of the volume of extra-budgetary funding from industrial customers and the inclusion of the Ural RAS in the national project "Science". It will allow making a significant scientific breakthrough by creating world-class centers, implementing innovative fundamental and applied projects, upgrading equipment, and attracting talented personnel.

The expected results are based on the accelerated scenario. They include: creation of world-class centers on the basis of the Urals' leading scientific institutions and higher educational institutions (at least 2); creation of the Ural scientific and educational center on the basis of academic institutions and leading scientific schools of the Urals and other regions; upbringing of publication activity and quality of publications to the level of advanced foreign countries; updating of scientific equipment (at least 50%); implementation of joint international projects, primarily within the framework of ASNTRK; creation of more than 40 new laboratories with active participation of scientific youth; increase of the number of young researchers under the age of 39 to 45%; construction and transfer of 6000 square meters of living space to the Ministry of Science and Higher Education of the Russian Federation in the form of office housing for academic institutions.

Conclusions

The generation, dissemination, and rational use of new knowledge and technologies after the implementation of research potential directly affect the socio-economic development of the region and its long-term efficiency. The study established a positive correlation (without time lags) of the key indicator of region's socio-economic development − per capita GRP − with the following indicators of research potential: a number of researchers, a number of scientific organizations, researchers' salary fund and the share of researches' budget financing.

The correlation with delayed returns with a one-year lag is observed in the "research and development costs" and "internal research and development costs at the expense of the federal budget" indicators. The correlation with advanced one-year lag is observed in the "share of innovative products", "patents for inventions per researcher", "developed technologies per researcher" indicators. On the one hand, the knowledge and technologies created in this region might be used in the production of products and services and ensure productivity growth and costs' reduction. On the other hand, results of the use of research potential in the form of prepared technologies and specific results of intellectual activity ensure the innovation of products and services, increase their competitiveness on national and global markets. Today, the research sector, which produces new knowledge and transforms it into

innovative products, grows faster. It becomes the engine of regional intensive economic growth.

The article develops theoretical concepts that characterize the scientific and innovative spheres of the economy. The research potential, as an element of scientific and technological potential, associated with the segment of fundamental and applied research, implemented by scientific organizations, was identified. The results' practical significance is the justification of the regions' comparative analysis' methodology according to the level of research potential and its contribution to the socio-economic development of the region.

The development of science has a significant impact on bridging the gap between Russia and developed countries. It also provides national security, not only because the science sector creates breakthrough technologies, necessary for the development of the industrial complex and the innovative economy, but also because it gives jobs, increases productivity and wages, creates social conditions for economic stability[27]. At the same time, the economy of the Russian Federation entities, which have a high level of research potential development, is more competitive and attractive for investments. Such regions are characterized by high labor productivity and average per capita income indicators, positive GRP dynamics, and low unemployment.

However, a high concentration of scientists and researchers in the region is a necessary but insufficient condition for ensuring economic development with the help of knowledge and technology. The most important prerequisite for generating knowledge and creating breakthrough technologies is a high concentration of investment resources. As the experience of developing a Comprehensive development plan for the Ural Branch of RAS has shown, in order to achieve these ambitious goals, investments into capital construction, instrument base update, and large-scale digitalization of research processes are required. Another necessary condition is the creation of the environment for attracting private capital to science, formation of industrial partners' economic motivation for participation in research and development conducted by state science institutions.

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MODELING AND FORECAST OF SOCIO-ECONOMIC PROCESSES

Agent-Based Supercomputer Demographic Model of Russia: Approbation Analysis*

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Abstract. The article presents an agent-based demographic model of Russia designed to run on supercomputers. The technologies used in the model allow researchers to create an artificial society with the number of agents up to 109 and effectively parallelize the work of the simulator. The software package designed to implement the model combines separate subsystems written in programming languages of different levels. On the one hand, this provides effective load balancing between computing processes and messaging between agents (implemented in C++), and on the other hand, this simplifies the development of model blocks that implement the simulation of demographic processes (implemented in C#). The demographic processes in the model are simulated based on the actions of individual agents, taking into account their family ties, which they maintain by exchanging messages. Key features of the demographic agent-based models are the following: a) dynamic change in the size and composition of populations of agents − removal of part of the agents (their "death") and the emergence of new ones ("birth"); and b) separation of actions performed at the simulation step in stages, each of which can cause the revision of the general settings that are specific to regions or groups of agents, and/or exchange of messages between agents. In the course of computer experiments, the model has been tested on real data and has shown good results at testing for the following parameters: a) the quality of recreating the age-sex structure of the population for the country as a whole and in the regions with the use of the population of agents; b) the stability of the model and a low margin of error of the results of forecasting the main demographic indicators in comparison with the variants of Rosstat's official forecast; c) efficiency of parallelization of the program code when running on supercomputers. The model is the basic one for an integrated regional simulation model that is currently being developed; however, the model can be useful as an independent forecasting tool.

Key words: agent-based modeling, simulation of demographic processes, supercomputer technologies, application of METIS graph decomposition, demographic forecast for Russia.

Introduction

This article is devoted to the development of an agent-based demographic model for creation of artificial society with many agents-people. It is the continuation of the study presented in [1]. Agent-based models (ABM) are the class of models based on behavior imitation of separate agents, which can act independently in accordance with their interests and possibilities given to them by an environment (including other agents). Demographic processes, such as mortality, fertility rate, and migration, are classic examples of bottom-up processes, because decisions are made by certain individuals, and overall indicators are formed as a result of these individuals' aggregated actions.

Therefore, demography is one of the areas of application of the agent-based approach, which is widely represented in the literature.

It is necessary to mention the most peculiar and recently published works.

Agent-based models of social interactions and demographic behavior [2−3], which represent different components of demographic system, such as creation of marriages, changes of fertility, etc. These works also investigate differences of people's behavior, related to their identification with different types of culture, and corresponding differences of reproductive behavior.

Artificial population models [4−5] review ABMs with agents of complex structure and higher number of states, which allow

forecasting demographic dynamics on different levels – from households to Great Britain's population.

The most complete description of ABMs usage for simulating demographic processes, from the formation of married couples and the impact of social norms on fertility to people's decisions to change a place of residence, is presented in a book *"Agent-Based Computational Demography: Using Simulation to Improve Our Understanding of Demographic Behavior"* [6].

It is obvious that complete simulation of demographic processes on the country-scale requires creation of large population of agents in the model. It transforms ABM into much-agent (multi-agent) system [7] and requires usage of high-performance equipment and specialized software for calculations.

The article [1] included specific features of multi-agent models, used for imitation of dynamics of large socio-economic systems, which are important due to the organization of their work's parallelization:

• population agents are linked to a particular region (jurisdiction) and coordinates on the map of a region and a country (have a place of residence);

• the number and spatial distribution of the agent population changes during the simulation period, because, in the course of a computer experiment, agents can migrate independently from region to region, be destroyed, and create new agents;

• agents have "social connections" with other agents, with whom they exchange messages with varying intensity, and these connections can be dynamically formed by agents from different jurisdictions during the simulation period;

• agents' place of residence and their connection with other agents significantly affect agents' behavior in the simulation of different processes (selection of residence place, family formation, birth of children, etc.).

The article, on the example of the Russia's demographic agent-based model, justifies selection of methods for programming multi-agent ABM, which allow implementing author's approach to creating quite realistic simulations of demographic processes, well-scaled for agents' population of the size equal to our country's population.

In the last few years, specialized software environments for building agent models with the function of automatic, or semi-automatic, parallelization of program code with subsequent launch on supercomputers have appeared.

Repast for High Performance Computing (RepastHPC) is the most popular computer software (CS), made for ABM design with the aim of the implementation in high-performance environments [8].

High-performance CS for building large-scale ABM – Pandora – developed in Barcelona Supercomputing Centre and gives full support of geographic information systems (GIS), which is important in cases, when geographical attachment of agents is required for models' functioning [9].

Environment of building agent-based models ABM++, the first version of which appeared in 2009 as a result of the tool's modernization, was developed in 1990–2005 at the Los Alamos National Lab in the process of building large-scale ABM [10].

SWAGES – extensible distributed environment for large-scale agent-based modeling – developed by scientists from Tufts University (Medford, Massachusetts, USA), provides

automatic parallelization of program code, supports multiple programming languages and plug-ins for visualization, statistical analysis, and automatic error handling [11].

CyberGIS Toolkit – a set of freely distributed open source software components for spatial analysis and modeling [12].

HPABM – hierarchical parallel modeling environment designed for developing complex agent models for investigating large-scale problems related to geospatial modeling [13].

D-MASON package allows implementing ABM in a distributed environment, increasing their performance, while ensuring backward compatibility with basic MASON environment. D-MASON operation is based on master/slave paradigm: the main application divides the simulated space into parts and distributes the workload across slave processes, each of which uses one or more Logical Processors (LP), according to their computing capabilities. Main tasks, solved with D-MASON, are: distribution of performed work, load balancing, and communication between processes, synchronization, and reproducibility [14].

POLARIS – CS for building ABM for simulations of transport flows was developed in the Argonne National Laboratory (national research center of the United States Department of Energy). Main utilities of the developed package are: (1) a module responsible for parallel processing of events; (2) a module that implements inter-process exchange; (3) a library for visualization; (4) a library for data input and output, etc. By its nature, POLARIS is a set of low-level libraries that provide a user-friendly programming interface and a runtime environment that makes it easier to write code. Transport simulators, developed with POLARIS, use a large amount of data, which is often

processed simultaneously by different software modules. In this regard, directives for programming multithreaded applications with shared memory are used in parallel mode [15].

Researchers from The Autonomous University of Barcelona developed an instrument for ABM parallelization – *Care HPS* (High Performance Simulation), which allows automatic solution of several tasks: the distribution of executed code, balance of the computational load, communication and synchronization.

Care HPS supports MPI message transfer interface, OpenMP technology and contains several components implemented in C++. Users solve the task of designing the model (including usage of ready-made functional controls), and all the work on distributing agents across processors, synchronizing processes is performed by the framework. Currently, Care HPS developers use this framework in a project aimed at predicting the spread of dengue fever [16].

The number of specialized software products for the implementation of agent-based models on supercomputers grows. In addition to the described ones, we should also mention MUSE [17], LUNES [18], MASS [19], and others.

However, all of these tools were initially developed for solving specialized problems. Although they have expanded significantly to the level of broad profile frameworks, they have nevertheless retained a certain "legacy" in the form of ineffective algorithms for solving other problems.

Practical experience of their usage has shown that, in the end, a less time-consuming way to build a specific agent model for subsequent launch on a supercomputer is its initial implementation from "scratches".

Thus, it is possible to significantly increase the efficiency of program code parallelization and, in addition, create a reserve for further complication with minimal performance losses.

Software implementation of the super-computer demographic ABM of Russia

Taking into account conclusions from the analysis of existing software tools for parallelizing software code, we have developed CS that provides:

1. Scalability of ABM operation on a set of nodes in a computing cluster.

2. Efficiency of multiprocessor operation of ABM due to the use of MPI system library, which is usually installed on each cluster, configured on its network system, and provides maximum throughput and minimum data transfer delays. Another feature of this library is also important: it is available for usage on regular personal computers, which allows using one technology without special modification while developing and performing calculations on a personal computer and supercomputers.

3. Simulation of the evolution of the internal state of agents, the formation of permanent and temporary links between them, the exchange of messages, and the appearance or disappearance of agents in the system.

4. Dynamic load balancing mechanism between computing nodes during the model operation, i.e. transferring agents from more loaded processors to another ones while preserving their state and relationships (an imbalance occurs during the model operation due to uneven disappearance of agents tied to different processors, as well as the appearance of new agents).

5. Simplification of ABM engineering and its further development by separating blocks that implement a system of parallelization with load balancing between computing processes and messaging between agents, built in C++, from thematic blocks that implement the simulation of demographic processes, which are written in the high-level programming language C#.

The work [1] showed how a rectangular grid, which binds each cell to a specific pixel in the image, is built in the model, constructed on the basis of source data on the number of regional population, received from a CSV-table, and the information on the geometry of regions, obtained from the map of Russia in raster format. Since each region is painted a different color, while analyzing this image, the connection of grid's cells with numbers of regions and other characteristics was installed. After that, the random distribution of several agent-residents among grid cells with specified total number of agents in the system and region was performed. Besides, the calculation of the decomposition of grid cells by processors was completed.

To calculate the grid decomposition, we used METIS graph algorithm [20] with weights (metis_partgraphrecursive variant). METIS algorithm takes a graph, specified through a matrix of links in the CSR format [21], an array of weights of the graph nodes, and returns the optimal distribution of the graph for a given number of parts with minimizing links between them. With this algorithm, the distribution of the source system by processors was obtained. It is important that this distribution must be made before creating agents, since the latter should initially be correctly distributed among cluster nodes. At the same time, the number of agent populations and the number of processors used are model parameters values of which are set by a user during computer experiments.

Algorithms, which implement these processes in the model, are shown in the article [1], and, in this paper, it is necessary to elaborate on the methods for ensuring the credibility of created artificial analogue of the simulated system.

In this regard, the first necessary thing is to set the starting conditions according to available official statistics for the base year. The second step is a fairly realistic simulation of population reproduction processes. In this paper, we review the simulation of processes of population's fertility and mortality. Simulation of population migration will require inclusion of additional source information and addition of appropriate procedures, the ideology of which was presented in the article [22]: this, however, will not affect the parallelization of ABM functioning.

The following Rosstat data for the base year were used as the initial information for the model.

• On the country's level:

— population's distribution by gender and age (age-sex pyramid), thousand people;

— mortality rates (per 1.000 people) differentiated by gender and age;

— retirement age for men and women by years of transition period, according to the 2018 pension reform.

• On the regional level:

— population, thousand people;

— share of population younger than working age, %;

— share of able-bodied population, %;

— share of population older than working age, %;

— total fertility coefficient;

— distribution of births by mothers' age (share of births by mothers from cohorts in five-year age intervals within reproductive age range: 15—19; 20—24; 25—29; 30—34; 35—39; 40—44 and 45—49), in %.

Setup of starting conditions corresponding to the available official statistics

At the beginning of the model's work, after reading the initial data, scaling the specified number of agents by regions, and creating the calculated number of agents in cells, it is necessary to determine the values of its individual features, associated with the simulated population reproduction processes, for each agent. These features, according to used simulation algorithms, are: agent's age, gender, maximum desired number of children in the family, and the number of children born. In addition, the agent "remembers" its family ties, because they are provided by its individual collections (lists): a collection of parents; children; siblings; other relatives.

The distribution of agents' age and gender values is implemented for accurate reproduction of the population's age and gender structure, specified in the initial data for the country and individual regions. In order to do this, obtained values of the agents' number in each region are further scaled:

a) by shares of population's main age groups in each region: younger than able-bodied; able-bodied and older population (considering the set values for the base year of women and men's retirement age), and then

b) by shares of each age cohort in its age group.

Obtained values of the shares from the total number of agents in the region are used as the probability of falling out of a particular age for an agent belonging to this region. In order to perform this scaling and get the age value for each agent, a specialized auxiliary module was developed. The gender of the agent is also determined in a probabilistic way, considering the sex ratio for the acquired age cohort.

In the model, the maximum desired number of children in a family is a random variable that

takes a value from one to seven with the specified beta distribution shifted to the left (the maximum is for two children). The specialized auxiliary module was also developed to determine the specific value of the desired number of children for each agent.

After the distribution of gender and age properties, the establishment of kinship relations between agents begins. First of all, for each agent from the agents' collection of the same region, a "mother" is selected – a female agent with a randomly determined age and with the number of children below the maximum desired number. The selection of the mother-agent's age is based on the usage of the births' distribution according to the mothers' age specified in the source data. After it, the number of children of the selected mother-agent increases, and the mutual entry of new relatives into the corresponding collections, conducted by the child-agent, the mother-agent, and the mother's relative-agents, happens.

Simulation of population reproduction processes at each step of the model operation

Example, given in the work [1], was developed for assessing the influence of the number of used processors on the efficiency of the model's work parallelization. Another parameter of the test model, impact of which on the model's performance was evaluated during the experiments, was the number of agents' connections, with whom they exchanged messages at each step. These connections were established randomly. In addition, the composition of the agent population was constant.

In the full version of the demographic ABM of Russia, presented in this paper, connections between agents are established on the basis of kinship, and there are significantly less of them

than in the test example: it reduces the number of messages sent at the step. On the other hand, in a simulation of processes of population reproduction, two things are considered: a) dynamic change of agents' population composition: deletion of agents (their "death") and the emergence of new ("birth" of agents); b) division of step actions into stages: there might be a need for overviewing common parameters, related to regions or groups of agents, and/or messages' exchange between agents. The presence of such stages means appearance of step synchronization points. It implies work suspension of processors which had already finished processing of agents, placed on them, and expect all other processors to finish work.

To implement dynamic addition and removal of agents in the system, it was necessary to switch from a single (end-to-end) index of agents to a double one. Now each agent is characterized by the number of the cell, in which it is located, and its number in this cell. The process of adding agents leads to the situation, when the counter of the agents' number grows in a cell, and its value is used for calculating agents' index. In the process of the agent's deletion, there is a recalculation of indices of other agents within its cell. A deleted agent should be excluded from collections of all agents with which it was bounded by family ties: this is why it sends messages to them.

As a result, it was necessary to stop using regional collections of age cohorts for organizing the simulation of step actions, since it was very time-consuming to keep them updated while deleting agents and switching to a double index. The rejection of collections led to a change in the fertility rate simulation algorithms.

For example, instead of selecting a female agent, who should give birth to a child, from a collection of women of a given age (which was done in order to reproduce the observed distribution of births by the mother's age), the corresponding age probabilities of child births were calculated. These probabilities were calculated for each region on the basis of the total number of women of reproductive age, the regional total fertility rate, the distribution of births by mother's age, and the number of women from each age group for whom the number of children born has not reached the desired maximum.

As the result, actions at a step of work were divided into stages, implementing phases of demographic processes simulation. Each stage may relate to one of the following types of objects: the entire country, a separate region, a separate agent. The model implements the following stages related to different stages:

1.   Stage and preparation phase:

•   Transition to the next year. Reset of counters, associated with the simulation of the fertility, on the level of the whole country and regions.

2.   Stage of agents' extinction:

•   *Phase of a "black mark" distribution (on the agent level):* agent's marking in case of a "black mark" (death), given to it in accordance with the age-sex mortality coefficient. Otherwise, an increase of the agent's age by one.

•   *Phase of recalculation of agents' indices (on the country level):* calculation of new indices for surviving agents in cells, where agent deletions are scheduled.

•   *Phase of indices' replacement (on the agent level):* sending of an updated agent index to all associated agents; the old index is replaced with a new one in all collections.

•   *Phase of agents' removal (on the country level):* removal of marked agents from collections.

3.   Stage of new agents' creation:

•   *Phase of calculating birth probabilities (on the country level):* calculation of birth probabilities for women of different ages (by region);

•   *Phase of agents' birth (on the agent level):* creation of a subsidiary agent in case of a childbirth event. Setup of kinship relationships.

4.   Stage of simulation step completion:

•   *Phase of statistics' collection (on the country level):* collection of regional and country statistics and preservation of results in external files.

At the end of each phase, the message queue is checked. If it is not empty, messages are sent to recipients.

Analysis of the experiments' results using the demographic ABM of Russia

1.   Analysis of model's initial state compliance with the original data, and the stability of recreating the specified demographic parameters

The models' parameters are the number of agent populations and the number of processors used. The initial distribution of agents by region and processors, as well as the assignment of age and gender to individual agents, is carried out using probability distributions, the stability of which depends on the number of tests. Therefore, it was necessary to assess the stability of the distribution of agent features depending on the values of the model's parameters

Table 1 presents the comparison of the results of agents' features distribution, gained during model experiments, with assigned distribution of population by gender and age (model data on agents' scaling distribution is changed into the number of population in thousands of people).

Table 1. Analysis of adequacy and stability of the reconstruction in the model
of the age-sex pyramid depending on the number of agents

Number of agents, million	Mean-squire deviation from the specified age distribution, thousand people		Deviation from experimental average values by age and gender, %
	Men	Women	
1	11.0	12.0	±2.7
2	8.0	8.4	±1.4
3	7.6	7.5	±1.1
4	6.3	6.6	±0.8
Source: calculated according to the results of computer experiments with the demographic ABM of Russia.			

Rosstat data was used as the initial information[1]. The experiments were performed on a personal computer (for a single processor) in order to estimate the minimum size of the population of agents required for an acceptable match with the age-sex pyramid of the Russian population specified in the initial data. In addition, *Table 1* provides data on the stability of the obtained gender and age distribution of agents, estimated by deviation from the experimental average values.

Data shows that there is a significant improvement of analyzed statistical indicators after increase of agents' number from one to two million. Thus, the standard deviation from the specified age distribution decreased in 1.38 times for men and 1.43 times for women, and the indicator characterizing the stability of the distribution, obtained during the experiments, improved in 1.93 times. With a further increase of agents' population to three and four million, these indicators continued to improve, but not so rapidly. As the result, when the number of agents was four million, the standard deviation decreased in almost two times, in comparison with the basic (1.75 and 1.82 times for men and women, respectively), and the deviation from the average experimental values – in more than three times (in 3.38 times). The spread

of the latter indicator's ±1.4% values, which is achieved when the number of agents is two million, may be considered acceptable. It is exactly the number of agents which might be considered minimum for obtaining relevant results of experiments on the country level.

If we estimate the necessary number of agents on the regional level, we should proceed from the number of agents obtained for the most sparsely populated regions of the Russian Federation. Thus, the population of the Magadan Oblast is only 144.1 thousand people, and, with two million agents in the model, this region accounts for less than two thousand agents. This number is clearly not enough to ensure the stability of the distribution of features of this region's agents-residents. For example, the stability of the beta distribution, which determines the desired number of children for agents and establishes the relationship between mothers and children, is achieved when the number of agents is 10 thousand. Based on these considerations, the requirements for the total number of agents should be at least five times higher.

However, all subsequent experiments were conducted to assess the sustainability of indicators on the country level.

2. Stability analysis of models' functioning

The next series of experiments was a simulation of reproduction processes in Russian population for twenty steps (years) ahead

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[1] The Demographic Yearbook of Russia. 2017: stat. coll. Rosstat. Moscow, 2017.

Table 2. Analysis of the stability of the resulting model indicators over entire forecast period

Indicator	Deviation from the experimental average values for the forecast period years, %	
	lower limit	upper limit
Population, thousand people	-0.07	0.06
Share of able-bodied population, %	-0.12	0.12
Total fertility coefficient per 1,000 people	-2.19	1.57
Total mortality coefficient per 1,000 people	-1.02	0.88
Source: calculated according to the results of computer experiments with the demographic ABM of Russia.		

with a population of two million agents and constant values of mortality and fertility. For Russia, forecasts of the dynamics of the following indicators were obtained:

• population, thousand people;

• distribution of population by major age groups, %;

• total fertility rate per 1000 people;

• total mortality rate per 1000 people.

The purpose of the experiments was to evaluate the stability of obtained simulation results. *Table 2*, which shows the boundaries of the variances of key output variables from the average values by years of the forecast period, allow assessing stability of these indicators (maximum and minimum values were indicated throughout the forecast period).

The table shows that indicators, such as the population size and the share of able-bodied population, demonstrate remarkable stability with a variation of the values, obtained in the course of experiments, around ±0.1%. The next largest deviation is the total mortality

rate (deviation around ±1%), and the largest variation is the total fertility rate (±2%). Thus, even if the number of agents is two million, the stability of the model may be considered satisfactory.

3. Analysis of model's parallelization efficiency

The next stage of testing the demographic ABM was evaluation of the effectiveness of parallelizing of its operation on a super-computer. In the test example, ten steps were calculated, and the average time value for a step was considered. *Table 3* shows the results of running the model on a different number of processors for two and eight million agents. *Figure 1* shows the corresponding acceleration curves of the model depending on the number of processors, where the number of processors on the abscissa axis increases by degrees of two.

It is interesting to compare the obtained dependence of the model's acceleration on the number of processors with the curves of the well-known Amdahl's law [23], which

Table 3. Estimation of acceleration in parallel calculation depending on the number of processors

Number of processors	Calculation time for 2M, s	Acceleration for 2M, times	Calculation time for 8M, s	Acceleration for 8M, times
1	3.029	1.00	17.211	1.00
2	2.016	1.50	11.064	1.55
4	0.948	3.19	7.053	2.44
8	0.625	4.84	5.215	3.30
16	0.653	4.64	2.962	5.81
24	0.499	6.07	2.245	7.66
32	0.476	6.35	1.019	16.88
48	0.383	7.90	1.395	12.33
Source: calculated according to the results of computer experiments with the demographic ABM of Russia.				

Figure 1. Comparison of acceleration in parallel calculation depending on the number of processors with different number of agents
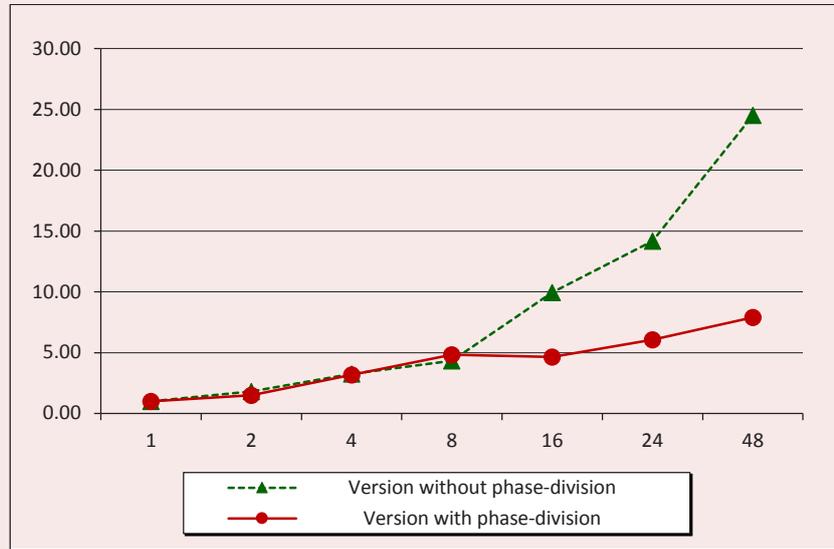
Source: calculated according to the results of computer experiments with the demographic ABM of Russia.

connects maximum achievable acceleration with the number of processors and the share of parallel calculations. Thus, we may assess how well the algorithms, used in the model to simulate the behavior of agents, are configured for parallelization of its work. A comparison with the theoretically achievable level of acceleration shows that, for two million agents, the reduction of the parallelization efficiency is comparable to the situation, when the share of sequential calculations would be about 10%, for eight million agents — as if it would be less than 5%.

4. Comparison of effectiveness indicators of model parallelization with synchronization points at the simulation step with the test example

The decrease of the parallelization efficiency is largely caused by the presence of intermediate synchronization points at each step of the model's functioning. Therefore, it was of great interest to find out, how much the parallelization performance of the model deteriorated in comparison with the first version [1] due to the appearance of stages, performed at each step. A comparison of two versions is shown in *Figure 2.*

The figure shows that an increase of the number of processors up to eight provides almost the same acceleration of two versions of the model, but a further increase of the number of processors reveals a significant difference of the parallelization effectiveness. So, for 16 processors, the acceleration of the model with additional synchronization points is half as fast as for the first version of the model (2.1 times) and for 48 processors — 3.1 times lower.

While evaluating the adequacy and effectiveness of the author's approach to the organization of the model's parallelization, it is necessary to compare it with closest analogues. For example, in [24], a distributed ABM of epidemics is described: within it, it is

Figure 2. Comparison of acceleration of the model functioning with parallel calculation depending on the number of processors for two versions with the number of agents 2 million
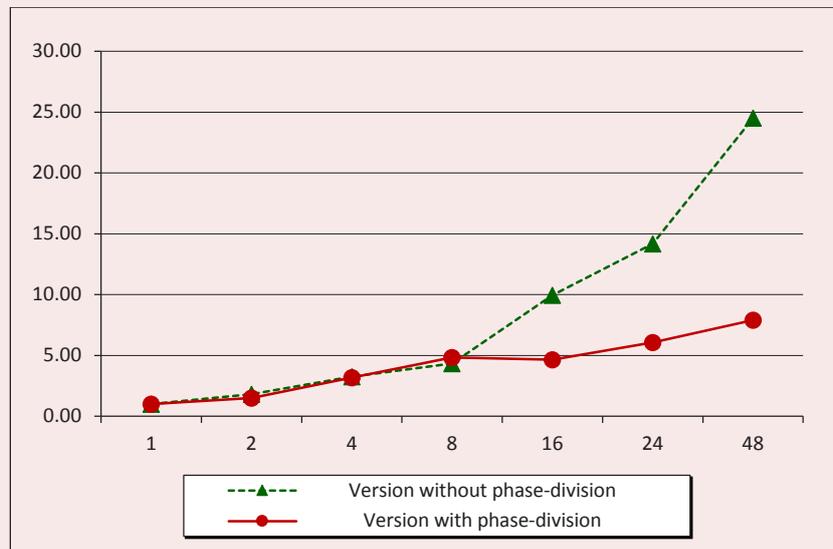
Source: calculated according to the results of computer experiments with the demographic ABM of Russia.

possible to create a society with the number of agents up to 6 billion. The model, as well as the one presented by the authors, uses an algorithm for distributing agents between computing nodes, which reduces intergroup interaction. In [25], an approach to parallelization of resource-intensive ABM is reviewed, agents of which exchange information and have spatial attachment. The acceleration, obtained by the authors in comparison with sequential version of the model, was, on average, 20 times. In our case, in the test example, the acceleration was up to 25 times with 48 processors, but addition of synchronization points significantly reduces this number. However, the total calculation time, as shown in *Table 3*, is quite acceptable.

5. Forecast results and comparison of received forecast with the Rosstat prediction

After making sure of the adequacy of the initial state of our ABM and the stability of its operation, we now evaluate the results of the simulation from a meaningful point of view. Thus, in the course of experiments with the model, forecasts of demographic characteristics were obtained in the context of regions and the country. In the same 2017 Demographic Yearbook of Russia[2], the variants of forecast (low, medium, and high) of the following main characteristics of country's population up until 2051 are given:

• population number;
• number of men and women;
• population number by separate age groups;
• births, deaths, and natural population growth;
• total fertility coefficient;
• life expectancy at birth.

_____

[2] The Demographic Yearbook of Russia. 2017: stat. coll. Rosstat. Moscow, 2017.

Figure 3. Comparison of forecast variants. Population, thousand people
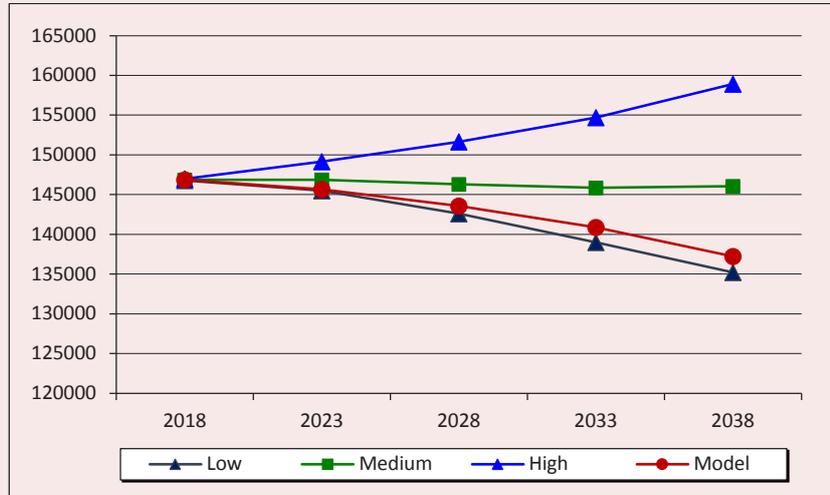
Source: calculated according to the results of computer experiments with the demographic ABM of Russia and data from 2017 Demographic Yearbook of Russia: Tab. 8.1.

Due to the fact that mortality rates in the experiments were considered unchanged, as well as the total fertility rate, on the basis of which the birth rate is simulated, it is obvious that the forecast of these indicators does not make sense in comparison with forecasts of Rosstat. The same applies to life expectancy at birth indicator, which is calculated on the basis of values of mortality indicators, differentiated by gender and age.

However, it is possible and interesting to compare forecasts on the number of Russian population and its structure within individual age groups obtained through model experiments. Figures 3 and 4 show a comparison of four variants of the forecast up to 2038: the low, medium, and high versions of the Rosstat forecast, as well as the forecast obtained as a result of ABM work (average values of several experiments with the population of two million agents were taken). *Figure 3* shows that the model population forecast for the entire period slightly exceeds the low version of Rosstat

(at the end of the period – by 1782.6 thousand people, or 1.3% of Russian population), while the model differs significantly from the average and high versions (by -6.2 and -13.8%, respectively).

Figure 4 shows the comparison of the model forecast of the share of able-bodied population with the corresponding versions of the Rosstat forecast. It can be seen that, during the entire period, the model forecast almost coincides with the high version of Rosstat and, at the end of the period, exceeds it by only 0.8%. The largest deviation of the model forecast was from the low version of Rosstat, but it was only -2%. In other words, even considering the assumption that the death rate and the total birth rate remain unchanged, the model allows us to obtain a fairly realistic forecast of this indicator.

It should be noted that this forecast, as well as Rosstat forecasts, was made under the assumption that the retirement age remains unchanged – 55 years for women and

Figure 4. Comparison of forecast variants. Share of able-bodied population, %
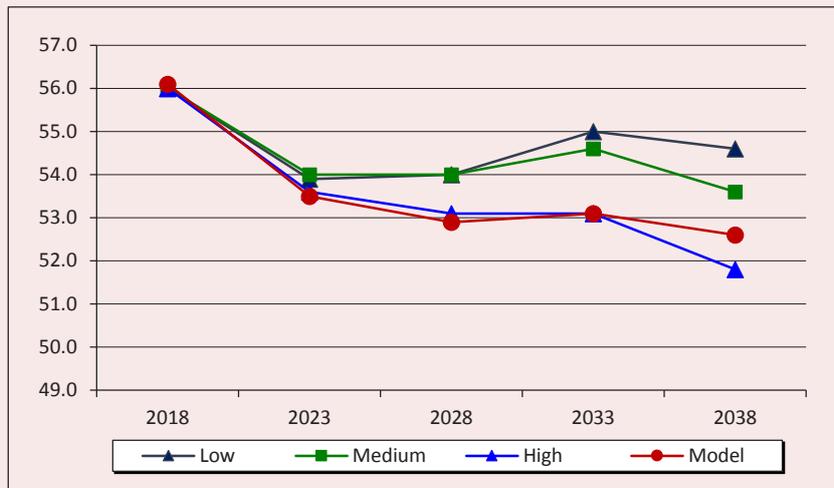
Source: calculated according to the results of computer experiments with the demographic ABM of Russia and data from 2017 Demographic Yearbook of Russia.

Figure 5. Comparison of forecast variants. Share of able-bodied population, %
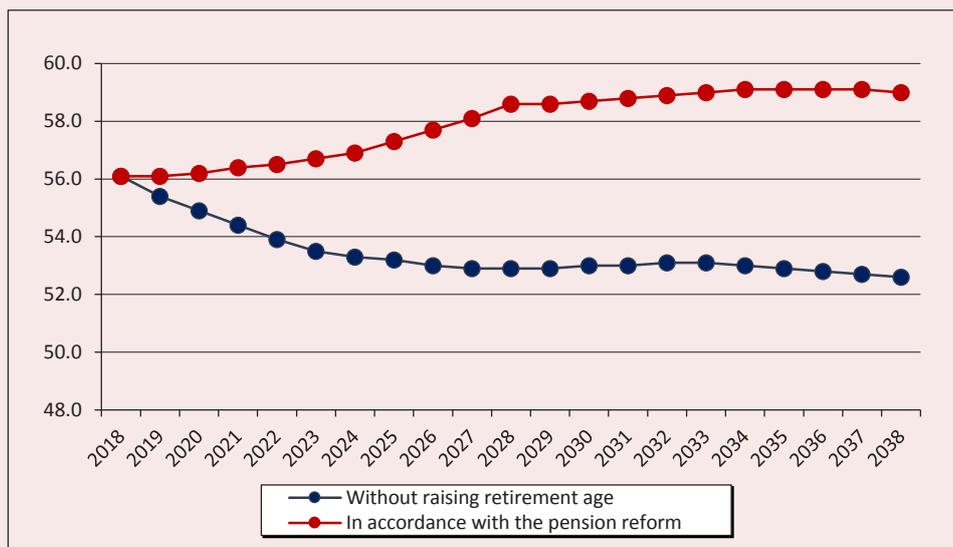
Source: calculated according to the results of computer experiments with the demographic ABM of Russia.

60 years for men. However, in 2018, the situation changed after the adoption of the pension reform, which was designed to gradually raise the retirement age over the next ten years. The forecast should take this into account. Therefore, in the next series of model experiments, the retirement age of agents was raised in accordance with the pension reform. The obtained results are presented in *Figure 5*, where two variants of model forecasts of the share of able-bodied population are compared: without raised retirement age and under the conditions of pension reform.

The figure shows that the share of able-bodied population, during the ten-year period of the reform, steadily decreases in the first version (from 56.1 to 52.9%) and grows in the second one (to 58.6%). As a result, at 2028 mark, the difference was 5.7% (8184.1 thousand people). At the end of the entire forecast period, the share of able-bodied population decreased to 52.6% in the first version and increased to 59.0% in the second one. The difference between them was 6.4% (9189.2 thousand people).

Conclusions

The analysis of the results of testing the presented demographic Russian ABM allowed us to draw the following conclusions.

The model showed a high degree of stability in the course of a comprehensive test despite the widespread usage of probabilistic mechanisms in setting the initial state of the system and simulating processes of population reproduction.

The technologies used in the model for parallelizing its operation on a set of computing nodes of a supercomputer allow conducting simulations with a large number of agents and achieve acceptable indicators of parallel effectiveness.

Presented demographic model is designed as a basic platform for a comprehensive regional ABM, because the mechanism of dividing the simulation steps into stages allows connecting blocks which simulate any socio-economic processes people participate in. Moreover, the implemented mechanism also allows specifying the type of objects the stage (phase) belongs to. Thus, the model is configured to introduce other types of objects into the artificial environment (for example, enterprises, municipalities, etc.) with the appropriate addition of simulated processes (social, environmental, economic, political), in which these objects participate. However, the demographic model also has an independent value as a tool that allows getting forecasts of demographic characteristics in the course of experiments within regions and the country.

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Spatial and Territorial Development of the European North: Trends and Priorities of Transformation*

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Abstract. One of the key goals in the development of Russia, the largest country in the world, is the necessity to provide optimal and efficient usage of its huge territories. However, transformational market changes, which happened after the collapse of the USSR in the 1990s, led to a sharp decrease in the state's role in the governance of spatial development. This policy had extremely negative economic and social implications: settlement contrast increased due to the production and population's retraction into areas of concentration. Simultaneous "washing" of population out from deep regions also took place. At the same time, these problems are especially relevant for Russia's northern territories, which are characterized by focal settlement, production's placement, and for other territories, which experienced negative consequences of market transition. These factors justify the relevance of this research. The goal of the paper is to study the features and substantiate priority areas of perfecting governance of Russian European North (REN) regions' spatial territorial development. Theoretical and methodological approaches toward understanding the essence of economic space and its development, the analysis of key trends and specifics of Russian European North's spatial development in the post-soviet period were studied. Also, we prove that economic space of REN is currently linear-nodular with significant areas of economic periphery. The article shows the role of first- and second-class nods in preserving supporting carcass of territories of Russian European North. Also, it is shown that such settlement systems might be a basis for formation and development of polycentric model of region's space organization. This model is aimed at

the revival and development of sustainable socio-economic and technological connections through the system "large city–small town–village".

Key words: spatial development, economic space, Russian European North, agglomeration, small- and medium-sized towns, Arctic Zone of the RF.

Introduction. There is a difficult and extremely painful set of problems, challenges, and threats in spatial development of modern Russia. It is, first of all, tied to inefficient usage of huge territories and phenomenal country's wealth[1]. Moreover, this space is sometimes considered a burden. There are even foreign studies, the authors of which try to assess Russian Federation's losses from inefficient spatial organization of the country[2].

It needs to be mentioned that the peculiarity of Russian spatial economic development at all of its stages (including Imperial and Soviet stages) is dominative participation of the state in this process[3]. However, a quarter of a century ago, in the period of active transformational economic changes, authorities almost completely abandoned direct participation in country's spatial development. This policy led to extremely negative economic and social consequences: settlement contrast increased due to the production and population's retraction into areas of concentration with simultaneous "washing" of population from deep regions. The basic trend of the last few centuries has been the strengthening of concentration of production, human capital, and infrastructure in large cities (first of all, in Moscow and Saint Petersburg agglomerations). All these processes lead to escalation of new challenges of Russian spatial development[4] (*Tab. 1*).

Obviously, such spontaneous spatial self-organization is the movement toward territorial desertification and economic degradation of a large part of Russian territories.

Top officials of the state pay special attention to the necessity of increasing efficiency of governance of country's spatial development. Thus, V.V. Putin, the president of the Russian Federation, suggested "launching a large-scale program of Russian spatial development, including the development of cities and other settlements, and, at least, doubling spending on these purposes in the next six years" during his Presidential Address to the Federal Assembly[5]. At the same time, the development of cities and other settlements should be connected with the solution of problems in the spheres of health, education, environment, and transport.

Thus, taking into account these principles and country's development targets, which are identified by the Strategy-2020, Russia's National Security Strategy, and the Strategy of Spatial Development of the Russian Federation until 2025, adopted in 2019, significant efficiency increase of spatial factor's usage should become the purpose of spatial development governance. It must be used for strengthening Russia's competitive position in

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[1] Thus, currently, each RF citizen has almost 12 hectares of land, i.e. almost 40 hectares per family [1].

[2] In particular, according to the assessment of Brookings Institution (Washington, USA), estimated losses constitute 2.3–3.0% of GDP [2].

[3] At the same time, the policy was based on the ideas of such prominent figures as S. Witte, P. Stolypin, V. Vernadsky, N. Kondratiev, A. Chayanov, and others.

[4] These problems were analyzed quite comprehensively and systematically in one of the first drafts of "The concept of the spatial development strategy of the Russian Federation for the period up to 2030", developed by the Ministry of Economic Development of the Russian Federation. Available at: http://карьеры-евразии.рф/uploadedFiles/files/Kontseptsiya_SPR.pdf

[5] Presidential Address to the Federal Assembly, dated March 1, 2018. Available at: http://www.consultant.ru/document/cons_doc_LAW_291976

Table 1. Main challenges of current Russian spatial development

Challenge	Its content
1. Unprecedented centripetal vector of development	It appears, first of all, *in the form of a sharp increase in Moscow's economic role according to all major economic development's indicators* and *in the form of intensive strengthening of regional centers' economic and political role on the level of many RF entities*. As a result of these centripetal trends, *there was a significant compression of previously developed space, a noticeable economic consolidation of city-centers' space*.
2. Interregional contrasts, unprecedented in the practice of foreign federations, a very significant unevenness in modern regional development	Often interregional differences are so significant that *RF entities, dragging behind, according to experts, will need hundreds of years to reach the level of modern developed regions*. It shows the presence of intercontinental-wide contrasts in the country (for example, such as between the countries of Europe and Africa).
3. Unfavorable global geopolitical situation, which actualizes problems of Russian national security	The period of unprecedented openness in the 1990s *was replaced by a period of rivalry and confrontation between Russia and developed countries*. At the same time, there has been a real threat of preserving economic and political sanctions pressure on the country. *There is a high probability of artificial maintenance of geopolitical instability on Russian borders*.
4. Poorly developed infrastructure	*A significant contradiction between the country's spaces and forms of its infrastructural, technical and technological arrangement is characterized as a communication (or network) gap*. Thus, high-speed highways are still rare, even nearby federal centers. The same goes for sustainable high-speed broadband connection. *Many remote Russian periphery territories, situated far away form cities-centers, might be characterized by transport and electronic inaccessibility*
5. Extreme unification of norms and rules of country's spatial arrangement and insufficient elaboration of the territorial block of federal legislation	For Russia and its enormous diversity of natural, social, and environmental conditions, *it is important to show territorial differences in federal legislation* (take into account the specifics of the North and the Arctic, old developed moderate Central zone, problematic territories of different types, etc.). Legal asymmetry is necessary, because it might be the most important prerequisite for the alignment of conditions for various RF territories' development.

the global economy, while taking into account the preservation and strengthening of the national security's foundations in a changing world.

It is also important to improve the population settlement system, taking into account the preservation of its supporting carcass on the basis of diversification of different settlements' functions, creating conditions for the development of urban agglomerations and non-urbanized territories of different hierarchical levels and scales. It is necessary to create a framework[6] of regional and sub-regional centers of economic growth concentration, capable of forming and transferring impulses of modernization and

economic development to adjacent entities on the basis of network effect implementation [3]. These issues are particularly important for northern territories of the country, which are characterized by the focal nature of settlement and production placement. This factor caused *the relevance* of the presented work.

The goal of this paper is to study specific features and to substantiate priority directions of spatial and territorial development management improvement of Russian European North's (REN) regions.

The result will be achieved through the completion of following objectives:

1. The study of theoretical and methodological approaches for understanding the essence of economic space and its development.

2. Analysis of key trends, peculiarities of territorial and spatial development of Russian European North at the current stage.

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6 A framework is a binding mechanism that holds together different territorial socio-economic systems, heterogeneous, differently specialized parts of the territory. To date, a large set of "framework" terms has been introduced into scientific circulation: urban framework, infrastructure framework, support framework of settlement, framework of development of new areas, support ecological framework, etc.

3. Justification of priority areas of improving Russian European North territories' management on the basis of developing polycentric model, which is aimed at the revival and development of sustainable socio-economic and technological connections through the system "large city—small town—village".

Theoretical aspects of the research. Issues of studying peculiarities and problems of increasing governance efficiency of Russia's spatial development have been an important scientific objective for the last few centuries. At the same time, as the academician P.A. Minakir notes, "the common problem is that the spatial economy cannot formulate the primary hypothesis: what is the economic space as the subject of research and the object of economic policy". In economic studies, economic space is usually considered a real (physical) or abstract (conceptual) [4].

One of the key scientists, who belong to the domestic school of spatial economy, is the academician A.G. Granberg: he understood economic space as the saturated territory which contains many entities and connections between them — settlements, industrial enterprises, economically developed and recreational areas, transport and engineering networks, etc. [5, 6]. So, economic space exists inside physical space, and it is defined, first of all, through existence of different socio-economic objects and connections between them. Anyway, the similar interpretation of space is proposed by P. Krugman [7].

The whole group of researchers analyzes this category through the prism of relations between economic agents (P.A. Minakir, A.N. Dem'yanenko, N.Yu. Gagarina[7], Ya. Krukovskii, etc.): this approach implies that the

emergence of economic space is only possible due to the emergence of economic relations [8, 9].

In this study, we take the definition of R.F. Gataullin, A.G. Karimov, A.G. Komarov (2014): economic space is "the part of physical space which is subjectively constructed in the course of reproduction; it reflects geographically isolated and localized in time process of transactions between economic agents, formed on the basis of their economic interests' implementation" [10]. This definition, in our opinion, precisely sums up the nature of economic space, and it is more informative, because it allows integrating characteristics of real and conceptual spaces inside it.

Economic space has a number of features and characteristics, or so-called "generic" features [11, 12, 13]. In real situations, region's space acts as discrete (i.e. the space where all the points are isolated from each other); heterogeneous (the presence of different parts in the structure); polarized (heterogeneous, economic development takes place around the leading industry, the "growth pole"); anisotropic (ability to show different features in different directions).

The quality of economic space is defined by many characteristics and parameters[8]. According to A.G. Granberg's approach, it is possible to point out the following parameters for assessment:

— density (it is characterized by economic and common density of territory's population, density of communication's ways (automobile, railways, etc.)[9], etc.);

[7] Gagarina G.Yu. Development of methodology of spatial integration management of Russian regions' economy: Candidate of Sciences (Economics) dissertation. 08.00.05. Moscow, 2013. 328 p

[8] Chuvashova M.N. Assessment of the quality of economic space of the region of raw materials orientation: Candidate of Sciences (Economics) dissertation. 08.00.05. Krasnoyarsk, 2016. 235 p.

[9] This is one of the key indicators of the quality of the economic space, since the developed transport infrastructure accelerates the flow of all economic processes and provides conditions for the activation of production processes.

— placement (it is determined through the indicators of uniformity, differentiation, concentration of the population, entities of economic activity, and the presence of economically developed and undeveloped territories);

— cohesion (it is determined by the intensity of economic relations between parts and elements of space, by the conditions of goods, services, people's mobility, the development of transport and communication networks) [5].

At the same time, the space is constantly changing or transforming. The authors [14] understand the transformation of economic space as "the change in physical economy's localization and regional population, change of features of economic and social environment, which affect the efficiency of life activity and competitiveness of regional economy". This process is usually spontaneous, but it should have controllable nature[10].

Management of transformation and organization of economic space is implemented with the usage of various spatial models: functional (socio-economic zoning, formation of specialized zones, areas, parks), carcass (development of territorial carcasses, corridors, development axes, agglomerations and core cities on the basis of infrastructure); cluster [15].

At the same time, as G.M. Lappo notes, the carcass approach is efficient for solving traditional and constantly important research tasks: identifying differences in various areas; studying connections; studying the dynamics of processes [16]. N.N. Baranskii in his article

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[10] See: Minakir P.A. Modern approaches to the study of spatial development problems. Modern problems of spatial development. Proceedings of the International scientific conference dedicated to the memory and 75th anniversary of academician A. G. Granberg, Moscow, 2011, p. 47.

Okrepilov V.V. Sustainable spatial development and quality. Modern problems of spatial development. Proceedings of the International scientific conference dedicated to the memory and 75th anniversary of academician A.G. Granberg, Moscow, 2011, p. 52.

"On economic and geographic study of cities", published in 1946, overviewed economic carcass of a territory as the "basis which holds everything together, forms the territory, and gives it a certain configuration" [17, 18]. The carcass is an integral part of territorial structures (production, infrastructure, non-production, natural resources, and resettlement): it is the combination of centers of economic, social, and cultural life, as well as the combination of socio-economic lines, connecting these focuses in the interaction between them [19].

The concept of the supporting carcass is relevant for solving the problem of rational usage of large cities' economic potential. Thus, the mechanism of growth regulation of a large center may have different options: formation of agglomerations; targeted development; priority development of the "second" city; development of the selected (limited number) cities-"counterbalances"; development of sub-districts' centers; activation of small- and middle-sized cities (outside the agglomeration) [20, 21, 22, 23].

Thus, the concept of territory's carcass is based on the recognition of cities' special role (as focuses of economic activity) and its interconnections in country's economy. At the same time, the rest of the country is perceived as an auxiliary part of the economy, which is sometimes named a "fabric".

Primary results of the research. In the post-Soviet period of Russia's development, which is characterized by sharp liberalization and transformation of the whole country's socio-economic system, these changes negatively affected northern territories (market transition led to dramatic decrease of government's role in these territories' management, destruction of existing technological connections with other regions, reduction of many compensatory instruments' value which provided stable and successful development of these territories in a planned economy environment).

However, northern territories still have huge natural and resource potential and play an important geostrategic part in country's development. Thus, Russian European North[11] is one of the pivotal and largest (1.466 thousand km²) regions in the European part of the country, which has a beneficial economic and geographic position (the Barents and White seas on the north; Finland and Norway on the west, which opens up huge opportunities for developing foreign trade; economically developed Ural and central part of Russia on the east and south).

Russian European North, unlike Asian, is more populated and developed. It has an established carcass of settlement and production powers' placement, quite high level of urbanization. At the same time, post-Soviet market changes in the 1990s also negatively affected socio-economic and spatial development of these territories.

One of the key problems of REN, and many other regions of the country as well, is the reduction of permanent population number: from 1990 to 2017, it was near 1.6 million people (*Tab. 2*).

Thus, the number of the Murmansk Oblast's population in 1990−2017 decreased by 26.7%, in the Komi Republic − by 22.2%. Depopulation processes avoided the Vologda Oblast. Even more rapid reduction of population happened in rural areas: over the same time period, the number of rural residents in the Murmansk Oblast decreased nearly by two times, in the Arkhangelsk Oblast − by 38%, etc.

A more stable demographic situation is currently typical for administrative centers of Russian European North's entities, which are called "first class" nods[12] (Petrozavodsk, Syktyvkar, Arkhangelsk, Vologda) in the system of regional spatial organization. Significant natural and migration population decrease is observed

Table 2. Population numbers in Russian European North entities (at the beginning of the year), thousand people

Territory	Year											2017 to 2000, %	2017 to 1990, %
	1990	2000	2005	2010	2011	2012	2013	2014	2015	2016	2017		
Constant population													
Vologda Oblast	1354	1290	1235	1201	1199	1196	1193	1191	1187	1183	1177	91.2	86.9
Arkhangelsk Oblast (including Nenets AO)	1569	1369	1291	1225	1214	1202	1192	1183	1174	1166	1155	84.4	73.6
Komi Republic	1240	1043	985	899	890	881	872	864	856	851	841	80.6	**67.8**
Murmansk Oblast	1189	923	864	794	788	780	771	766	762	758	753	81.6	**63.3**
Republic of Karelia	792	729	698	643	640	637	634	633	630	627	622	85.3	78.5
Rural population													
Vologda Oblast	462	403	393	350	356	343	339	335	333	329	325	80.6	70.3
Arkhangelsk Oblast	411	343	349	297	289	282	280	27	265	259	254	74.1	**61.8**
Komi Republic	297	258	240	207	203	200	196	193	189	187	184	71.3	**62.0**
Republic of Karelia	144	186	171	141	138	135	132	129	127	124	122	65.6	84.7
Murmansk Oblast	100	71	74	57	57	57	56,6	57	57	57	58	81.7	**58.0**
Source: calculated on the basis of data from the official website of Unified Interdepartmental Statistical Information System (UISIS). Available at: www.fedstat.ru													

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[11] In this work, a REN content is reviewed within borders, the content of which is given in the current All-Russian Classifier of Economic Regions. OK 024-95 (approved by the Resolution of Russian State Standard no. 640, dated 27.12.1995).

[12] In Russian European North, researchers distinguish 4 classes of economic nodes, in accordance with the number of economically active population: first class nodes − more than 100 thousand people, second class − 60−99 thousand people, third class − 30−59 thousand people, fourth class − 10−29 thousand people. The rest of the economy has a non-node form of placement [24].

in small towns, which are specialized in timber cutting, with practically developed mining resources, old industrial areas (so-called "industrial periphery"), and in rural periphery [25].

One of the key aspects characterizing the quality of economic space is the density of population, including residents of able-bodied age. Thus, in many studied entities (excluding the Vologda Oblast), population density is 2—5 people/km^2, which is much lower than average Russian level (8.6 people/km^2) (*Tab. 3*). In the post-Soviet period, this indicator continued to lower. Density of able-bodied population does not exceed 2 people/km^2. These numbers show extremely low concentration of human and labor resources on northern territories, existence of the focal settlement in the "first" and "second" class nodes, which limit the possibility of ensuring a balanced spatial development.

At the same time, as V.N. Lazhentsev notes, there are quite stable, so-called historic-cultural, "cores" of settlement in REN: Pomor'e, Vologda-Belozersk land, Veliky Ustyug, Vychegodsky, Sysolsky, Mezensky, and Pechorsky districts [26].

Significant changes in territorial placement of main sources of added value appeared in the post-Soviet period. Thus, in 1995—2017, a share of the Vologda Oblast's GRP in Russia's GDP decreased by 0.73 p. p. (from 1.29 to 0.55%), by 0.60 p. p. — in the Komi Republic (from 1.23 to 0.62%), and by 0.47 p. p. — in the Murmask Oblast (from 0.96 to 0.48%). In the last few years, the role of the Arkhangelsk Oblast and Nenets Autonomous Okrug in these processes has become more important (*Tab. 4*).

In the structure of the European North entities' GRP, types of economic activities related to mining play a major role (in 2017, in the Nenets Autonomous Okrug — 76.2%, the

Table 3. Density of population in Russian European North entities, people/km²

Region	Year									2017 to 2000, +/-	2017 to 1990, +/-
	1990	1995	2000	2005	2008	2010	2015	2016	2017		
RF	8.7	8.7	8.6	8.4	8.3	8.4	8.5	8.6	8.6	0.0	**-0.1**
NWFO	9.1	8.8	8.5	8.2	8.0	8.1	8.2	8.2	8.3	-0.2	**-0.8**
Vologda Oblast	9.4	9.2	9.0	8.6	8.4	8.3	8.2	8.2	8.2	-0.8	**-1.2**
Murmansk Oblast	8.2	7.3	6.4	5.9	5.8	5.5	5.3	5.2	5.2	-1.2	**-3.0**
Republic of Karelia	4.4	4.2	4.1	3.8	3.8	3.6	3.5	3.5	3.5	-0.6	**-0.9**
Komi Republic	3.0	2.7	2.5	2.3	2.3	2.2	2.1	2.0	2.0	-0.5	**-1.0**
Arkhangelsk Oblast (including NAO)	2.7	2.5	2.3	2.2	2.1	2.1	2.0	2.0	2.0	-0.4	**-0.7**

Table 4. Share of entity's GRP in RF GDP, %

Region	Year								2017 to 2016, p.p. (+/-)	2017 to 1995, p.p. (+/-)
	1995	2000	2005	2008	2010	2015	2016	2017		
NWFO	9.741	7.919	8.329	8.238	8.515	8.671	8.982	8.898	-0.08	-0.84
Arkhangelsk Oblast (including NAO)	0.978	0.846	0.770	0.722	0.805	0.755	0.791	0.807	0.02	-0.17
Komi Republic	1.225	0.814	0.793	0.716	0.764	0.636	0.637	0.624	-0.01	**-0.60**
Vologda Oblast	1.286	0.947	0.898	0.722	0.567	0.576	0.555	0.552	0.00	**-0.73**
Arkhangelsk Oblast. (without NAO)	n.d.	n.d.	n.d.	n.d.	n.d.	0.482	0.495	0.507	0.01	-
Murmansk Oblast	0.956	0.755	0.615	0.523	0.504	0.483	0.503	0.484	-0.02	**-0.47**
Nenets Autonomous Okrug	n.d.	0.163	0.207	0.222	0.315	0.273	0.296	0.300	0.00	0.30
Republic of Karelia	0.560	0.386	0.357	0.284	0.260	0.255	0.269	0.274	0.01	-0.29

Komi Republic – 37.2%, the Arkhangelsk Oblast – 30.9%). At the same time, processing activities have been developed more in the Vologda (38.1%) and Arkhangelsk (26.9%) oblasts.

The leading branches of REN specialization are TIC, ferrous and non-ferrous metallurgy, chemical industry, and FEC, based on the mineral resource base of the region; in the Vologda region, animal husbandry and mixed

Table 5. Localization coefficient according to main types of economic activity in the regions of Russian European North (2017)

RF entity	Types of economic activity
1. Republic of Karelia	– mining and enrichment of iron ores (32.8) – mining of stone, sand, and clay (16.9) – production of cellulose, wood pulp, paper, and cardboard (16.9) – fishery and fish farming (13.8) – timber cutting (12.0)
2. Komi Republic	– production of cellulose, wood pulp, paper, and cardboard (16.9) – pipeline transport activity (8,4) – wood processing and manufacture of wood and cork products (except furniture), manufacture of straw products and weaving materials (5.4) – production of crude oil and petroleum (associated) gas (3.2) – coal mining (2.5) – provision of services in the area of mining (2.4)
3. Arkhangelsk Oblast	– production of cellulose, wood pulp, paper, and cardboard (20.8) – sawing and planing of wood (9.8) – manufacture of other vehicles and equipment (9.5) – logging, provision of services in the area of forestry and logging (8.9) – hunting, control, and shooting of wild animals, including the provision of services in these areas (7.5) – production of crude oil and petroleum (associated) gas (3.2) – activities of internal water passenger transport (3.4)
4. Nenets Autonomous Okrug	– production of crude oil and petroleum (associated) gas (18.5) – provision of services in the area of oil and natural gas (13.9) – pipeline transport activity (1.9) – activities in the areas of architecture, engineering surveys, and provision of technical advice in these areas (1.2)
5. Vologda Oblast	– production of other steel products through primary processing (15.7) – production of cast iron, steel, and ferroalloys (15.5) – sawing and planing of wood (8.0) – timber cutting (7.6) – forestry and other forestry activities (7.3) – production of basic chemicals, fertilizers and nitrogen compounds, plastics and synthetic rubber in primary forms (6.8) – manufacture of wood products, cork, straw, and weaving materials (4.9) – production of dairy products (2.7) – mixed agriculture (1.9) – animal husbandry (1.5)
6. Murmansk Oblast	– fishery and fish farming (45.1) – development of construction projects (construction of buildings, 30.9) – mining and enrichment of iron ores (20.1) – supporting activities in financial services and insurance (8.1) – production of basic precious metals and other non-ferrous metals, production of nuclear fuel (5.2) – repair and installation of metal products, machinery, and equipment (4.2)

Source: own calculations on the basis of UISIS data according to formula: $C_l = \dfrac{V_r}{Sh_r} : \dfrac{V_c}{Sh_c}$, where: V_r – the volume of goods (services) production according to type of economic activity on the territory of the RF entity; V_c – the volume of goods (services) production according to type of economic activity across the country; Sh_r – total shipment of goods and services according to all economic activities of the region (entire economy); Sh_c – total shipment of goods and services according to all economic activities across the country (entire economy).
High values of the coefficient are due to calculations of detailed TEA of the region.

agriculture are quite developed. This is proved, in particular, by the calculated localization coefficients for the main types of economic activity of Russian European North regions (*Tab. 5*).

The main trend in the spatial development of Russian European North regions' in the post-Soviet period is the concentration of population and economic activity in "node" points and periphery growing. Thus, for example, there was a trend of population con-centration near the administrative center in the Komi Republic in 1990−2017 (Syktyvkar's share in the number of entity's total population increased from 19.8 to 30.6%; the same is observed in Syktyvdinsky District); Ukhta's share increased from 11.3 to 14%, Sosnogorsk's − from 5 to 5.2%. At the same time, there is a considerable population's

outflow from the territories of industrial periphery, municipalities of the northwestern "corner" (*Tab. 6*).

Primary centers of industrial production in the Komi Republic are Usinsk, Syktyvkar, Ukhta, and Pechora. The status of Usinsk, as being the key industrial center, has noticeably grown over the last twenty years (its share in the total volume of industrial products' production increased from 12 to 37 p.p.), and currently this entity accounts for more than a third of the total industrial products' production. The main industry is the production and transportation of oil and gas. At the same time, a number of the Republic's single-industry towns (Vorkuta, Inta, and some other industrial periphery cities) have significantly lost their positions due to the attenuation of economic activity.

Table 6. Share of Komi Republic municipalities in total population number
and volume of entity's industrial production, dynamics of its change, % (p.p.)

Total population in an entity				Total volume of industrial products' production			
Municipality	Share, %		2017 to 1990, p.p.*	Municipality	Share, %		2017 to 1990, +/-***
	1990	2017			1997 г.**	2017 г.	
Syktyvkar	**19.8**	**30.6**	**+10.8**	**Usinsk**	**12.7**	**37.0**	**+24.4**
Ukhta	**11.3**	**14.0**	**+2.7**	**Knyazhpogostsky**	**0.8**	**2.6**	**+1.8**
Syktyvdinsky	**2.3**	**2.8**	**+0.5**	**Pechora**	**7.9**	**9.3**	**+1.4**
Sosnogorsk	**5.0**	**5.2**	**+0.2**	**Vuktyl**	**1.7**	**2.8**	**+1.1**
Izhemsky	**2.0**	**2.1**	**+0.1**	**Ust-Vymsky**	**0.7**	**1.0**	**+0.3**
Sysolsky	1.6	1.5	-0.1	**Syktyvdinsky**	**0.6**	**0.7**	**+0.1**
Ust-Tsilemsky	1.5	1.4	-0.1	Priluzsky	0.5	0.4	-0.1
Kortkerossky	2.3	2.2	-0.1	Ust-Tsilemsky	0.3	0.1	-0.2
Koygorodsky	1.0	0.9	-0.1	Troitsko-Pechorsky	0.3	0.1	-0.2
Ust-Vymsky	3.3	3.1	-0.2	Koygorodsky	0.3	0.0	-0.2
Priluzsky	2.4	2.1	-0.3	Izhemsky	0.3	0.0	-0.3
Udorsky	2.4	2.1	-0.3	Kortkerossky	0.3	0.0	-0.3
Ust-Kulomsky	3.2	2.9	-0.3	Sysolsky	0.3	0.0	-0.3
Usinsk	5.6	5.2	-0.4	**Syktyvkar**	16.7	**16.3**	-0.4
Troitsko-Pechorsky	2.0	1.4	-0.6	Ust-Kulomsky	0.6	0.0	-0.6
Knyazhpogostsky	3.0	2.3	-0.7	**Ukhta**	17.6	**16.8**	-0.7
Vuktyl	2.1	1.4	-0.7	Udorsky	0.8	0.1	-0.8
Pechora	7.4	6.1	-1.3	Sosnogorsk	7.0	3.9	-3.0
Inta	5.4	3.4	-2.0	Inta	7.5	0.8	-6.7
Vorkuta	6.5	9.4	-7.1	Vorkuta	23.2	7.5	-15.7

Source: * the table is sorted according to the rate of the indicator's change in 2017–1990.
** data on the volume of industrial production by municipalities have been publicly available since 1997.\
*** the table is sorted according to the rate of the indicator's change in 2017–1997.

Similar processes of population and economic activity's concentration are also specific for the southernmost entity of Russian European North – the Vologda Oblast. Primary pivotal centers of the region, "first class" nods are two large cities, which are administrative (Vologda) and industrial (Cherepovets) "capitals", and municipal regions bordering them. Thus, in 2017, 73.1% of Oblast's population lived there, 93.3% and 65.1% of industrial and agricultural production was manufactured there; also, 67.5% of investment volume into fixed capital and 79% of retail trade turnover is accumulated there. In turn, major number of (periphery) municipal regions, which are far from large cities, are currently characterized by growing problems in socio-economic development [27].

Development of economic space and provision of its connectivity largely depends on the level of transport infrastructure development. Currently, Russia is placed 75th in rating of the countries according to the efficiency of transport logistics (Logistics Performance Index): the country is behind developed and developing states (Germany, Sweden, Belgium, Brazil, Kazakhstan, Ecuador, Slovakia, Serbia, etc.).

Key trend of the European North's transport system functioning in the post-Soviet period is the decrease in the volume of cargo turnover of primary transport means, despite the fact that in 2000–2017, in some regions, the value of this indicator increased. Thus, in 1990–2017, shipments by railway transport decreased by almost ¾ in the Komi Republic,

in the Arkhangelsk Oblast – by 51.7%, in the Murmansk Oblast – by 38.3% (*Tab. 7*). The only entity which shows growth is the Republic of Karelia (3.8% growth).

In a similar way, decrease of cargo volumes shipped by automobile transport is happening. For example, in 1990–2017, cargo turnover of automobile transport of economic sectors in the Murmansk Oblast decreased almost by 82%, in the Republic of Karelia – by 68% , etc. These processes, along with significant decrease of cargo turnover and marine transport, show the sighs of decreasing amounts of interregional cooperation in Russian European North.

To assess the level of transport infrastructure development (railways, automobile roads, water routes) in the regions of Russian European North, coefficients of Engel (1), Goltz (2), and Uspensky (3) were calculated:

$$C_e = \frac{L}{\sqrt{S \times P}} \ , \qquad (1)$$

where: C_e – Engel's coefficient; L – total length of transport roads; S – area of a territory (country, region); P – population of the territory.

$$C_g = \frac{L}{\sqrt{S \times N}} \ , \qquad (2)$$

where: C_g – Goltz's coefficient ; L – total length of transport roads; S – area of a territory (country, region); N – number of settlements.

$$C_u = \frac{L}{\sqrt[3]{S \times P \times t}} \qquad (3)$$

where: C_u – Uspensky's coefficient; L – total length of transport roads; S – area of a territory (country, region); P – population of the territory; t – the total weight of cargo sent to the territory.

Table 7. Departure of goods by public railway transport, million tons

Territory	1990	2000	2017	2017 to. 2000, %	2017 to 1990, %
Russian Federation	2140.1	1046.8	1384.3	132.2	64.7
Russian European North	182.1	88.7	101.9	114.9	55.9
Murmansk Oblast	47.2	24.6	29.1	118.3	61.7
Republic of Karelia	25.5	14.7	27.6	187.8	108.2
Vologda Oblast	30.7	15.5	20.4	131.6	66.4
Komi Republic	55.7	24.9	13.7	55.0	24.6
Arkhangelsk Oblast	23.0	9.0	11.1	123.3	48.3

Goltz's coefficient allows conducting more correct assessment of transport infrastructure provision for population. In comparison with Engel's coefficient, it takes into account not only the number of population but settlements which are connected by transport network. Uspensky's coefficient, in turn, lets us evaluate the level of transport provision for territory's production sphere [28]. Acquired data is given in *Table 8*.

There are no clearly developed normative and threshold values of these coefficients in science and practice. However, it should be mentioned that the more these values are, the higher the level of regional transport infrastructure provision is. Thus, average Russian Engel's coefficient on automobile roads was 0.029 (in the Vologda Oblast − 0.069, in the Republic of Karelia − 0.033, in the Arkhangelsk Oblast − 0.024, in the Republic of Komi − 0.013, in the Murmask Oblast − 0.011). At the same time, in Canada, for example, which is also a northern country and comparable in terms of area, this coefficient is 0.056 [29]. Based on the data obtained, it follows that the highest level of transport infrastructure development, among the REN

regions, is typical for the Republic of Karelia and the Vologda Oblast. It is definitely a factor which provides a higher infrastructural spatial security of these territories.

In this regard, in our opinion, the Vologda Oblast should play a role of an outpost in the process of the North's development. One of the key priorities is the transformation of Vologda into transport and logistics center. The city has large railway transport corridors: "Transsib" (Vladivostok−Chelyabinsk−Buy−Vologda-Cherepovets−Babaevo−Saint Petersburg); "North−South" (Moscow−Danilov−Vologda−Sochi−Arkhangelsk, with a branch to Vorkuta and Murmansk), the Volga−Baltic Waterway, two airports (Vologda, Cherepovets). The multimodal logistics center will allow establishing close cooperation between northern, Arctic territories and southern regions. Counter flows of goods and services may go through it in order to provide northern territories with food, essential products, machinery and equipment, and southern territories with raw materials and products of its processing for the further development of technological chains [30]. All these factors support aforementioned idea.

Table 8. Assessment of the level of Russian European North regional provision with transport infrastructure* (2018)

RF entity	Total length of transport roads (auto-mobile, railway, internal waterways, L) thousand km (RF − million km)	Area of a territory (S), thousand sq. km (RF − million sq. km)	Number of population (P), thousand people (RF − million people)	Number of settlements (with residents, N), units	The total weight of cargo shipped on the territory (t), mil. tons	Coefficient		
						Engel (K_e)	Goltz (K_g)	Uspensky (K_u)*
RF	1.7	17.1	146.8	136094	6788.2	0.034	0.035	0.007
Vologda Oblast	31.3	144.5	1167	5899	70.8	**0.076**	**1.072**	**0.137**
Republic of Karelia	16.9	180.5	618	691	36.3	**0.051**	**1.513**	**0.106**
Arkhangelsk Oblast (including NAO)	25.9	589.9	1144	3156	37.8	0.032	0.600	0.088
Komi Republic	13.3	416.8	830	723	42.1	0.023	0.766	0.054
Murmansk Oblast	4.4	144.9	748	126	32.6	0.013	**1.030**	0.029
* sorting in the table is made according to the values of Uspensky's coefficient.								

Besides, Murmansk and Arkhangelsk's seaports should be further developed as bases of the Northeast Passage, the most important railways (Belkomur, Barentskomur), reconstruction and active usage of domestic water ways (Pechora, the Northern Dvina River, Sukhona, etc.), etc. It will allow providing domestic transport connectivity of Russian European North territories and its interregional integration with southern regions of the country.

Current conditions are characterized by the necessity to provide digitalization of the economy and its innovative development. In this regard, the important aim is to provide connectivity of economic space on the basis of Internet and cellular communication development. It should be mentioned that over the last few years there has been a positive trend in this aspect: the growing number of active Internet users (thus, in 2011−2017 their number in REN regions increased by 40−70%, *tab. 9*). Quite often, the number of mobile Internet users grew more rapidly. At the same time, there are still not enough digital technologies in the production sphere: for example, only 25−35 employees (out of 100) have a PC with available Internet access.

In this regard, the conducted analysis shows that the spatial structure of Russian European North's households is currently linear-nodal, with the existence of significant economically remote periphery (or "hinterlands"). According to RAS Corresponding Member Doc. Sci. (Geography) V.N. Lazhentsev, 70% of industrial production and significant part of available resources are concentrated in REN's economic nodes. Such nods are usually republican and districts' centers ("first class nodes") [26].

In general, economic space of Russian European North, as a region, is quite complicated. In its structure, researchers point out two economic sub-regions (Karel−Kola and Dvina−Pechora) which are different in geological and geographical characteristics, and features of the economic activity organization. Meanwhile, the European North, according to the E.E. Lejzerovich's grid, consists of 35 economic micro-regions which include several municipal regions, urban settlements, neighboring communes [31].

Table 9. Number of active users of fixed and mobile broadband Internet
access per 100 people (at the end of the year), units

Region	2011	2012	2013	2014	2015	2016	2017	2017 to 2016, %	2017 to 2011, %
Fixed broadband Internet access									
RF	12.2	14.4	16.5	17.0	18.3	18.6	21.0	112.90	172.13
Republic of Karelia	21.6	23.9	25.6	27.5	28.9	29.8	30.9	103.69	143.06
Murmansk Oblast	15.3	17.2	18.4	19.5	23.4	25.9	28.3	109.27	184.97
Komi Republic	14.7	16.5	16.9	17.6	26.7	28.8	25.1	87.15	170.75
Vologda Oblast	13.8	16.2	17.7	18.9	20.0	20.2	22.5	111.39	163.04
Arkhangelsk Oblast (including NAO)	14.1	15.6	16.2	16.8	17.5	17.3	21.9	126.59	155.32
Mobile broadband Internet access									
RF	47.8	52.6	59.8	64.5	68.1	71.1	79.9	112.38	167.15
Murmansk Oblast	43.0	47.1	54.1	58.9	61.2	56.0	76.3	136.25	177.44
Komi Republic	38.9	44.7	45.5	47.4	74.5	75.6	75.2	99.47	193.32
Arkhangelsk Oblast (including NAO)	38.5	43.6	47.2	49.7	51.7	57.1	66.9	117.16	173.77
Republic of Karelia	38.1	40.8	44.3	48.4	52.0	47.2	63.1	133.69	165.62
Vologda Oblast	47.7	51.8	56.2	57.0	62.3	56.2	61.2	108.90	128.30

Propositions and conclusions. Destructive processes in the development of economic space of Russian European North in the post-Soviet period and its compression actualize the task of improving economic activity centers' placement while preserving its support carcass by creating environment for the development of urbanized territories of different hierarchical levels and scales (economic nodes), as well as the territories of industrial and rural periphery; improving availability of social infrastructure services and the quality of living environment. In other words, it is necessary to form not just one or two (it is called "first class" nodes (republican and district centers) on the REN territories and largest and biggest urban agglomerations – across the country) but numerous centers of economic growth. Academician A.I. Tatarkin noticed that "small- and middle-sized towns should get development impulse through development and inclusion into agglomeration and other deep, outlying territories" [3].

At the same time, there is a development of a slightly different economic landscape in Russia. Its main feature is the formation of several dozen extra large (first of all, Moscow and Saint Petersburg agglomerations) and large compact areas of relative well-being, which have some attributes of post-industrial economy with simultaneous stagnation and degradation of vast agricultural and industrial territories outside these agglomerations[13]. Thus, in "The Strategy of Spatial Development of the Russian Federation until 2025", approved by the Resolution of the RF Government no. 207-r, dated 13.02.2019, 41 largest (more than 1 million people population) and large (0.5–1.0 million people) agglomerations are marked as prospective large centers of country and RF entities' economic growth. Meanwhile, in documents, not a single European North city is marked as the core of agglomeration. Several municipalities (Arkhangelsk, Vologda, Murmansk, Petrozavodsk, Syktyvkar, Cherepovets) are attributed to prospective centers of economic growth, which will contribute to economic development of the country by 0.2–1.0% annually.

We should agree with the author [32] that the current shift in the organization of production powers in favor of large and largest cities in Russia is the opposite to the agglomerating process, and it could be called enclavization[14], which is the spontaneous and virtually uncontrollable compression of the national economy's economic environment to several dozens of economic activity pockets in the main area of country's settlement.

In the environment of foreign-oriented and primarily export-raw materials model of the domestic economy functioning with the weak development of the domestic market and interregional economic and technological relations, such enclavization of economic activity will ensure short- and medium-term economic growth only through mobilization and periphery resources' redistribution. The consequences of this development model might be the strengthening of disintegration trends in the development; economic basis and social infrastructure's degradation of the territories located outside large cities [32].

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[13] In Russian scientific literature, the hypertrophied development of a city has always been considered one of the essential shortcomings of the territorial settlement organization and economy (See: Lappo G.M. *Cities of Russia: A geographer's view*. Moscow: Novyi khronograf, 2012. 504 p. Pivovarov Yu.L. *Fundamentals of geourbanistics: Urbanization and urban systems*. Moscow: VLADOS, 1999. 232 p. Smirnyagin L.V. Agglomeration: Pros and cons. *Gorodskoi al'manakh=City almanac*, 2008, vol. 3, pp. 152-168.)

[14] "Enclave" (fr. enclave and lat. inclavatus) – "closed, locked" and means part of the country's territory.

At the same time, in our opinion, there are more potential "second order" agglomerations[15] and other nodular forms of organizing space in the North. It might act as the counterweight to "first order" agglomerations (large and largest, according to the Strategy of the RF Spatial Development until 2025), might provide preservation of country's habitable large space outside the zone of cities' (with more than 500 thousand people population) direct influence, and might stop processes of its suppression on the basis of its integration into inter- and intraregional processes of labor division.

In particular, in the original project of "The Strategy of Spatial Development of the Russian Federation until 2025", the availability of 124 formed and developing agglomerations was justified. In turn, famous Russian scientist-urbanist A.M. Lola points out 146 large-city agglomerations, including nine agglomerations on the territory of Russian European North: Arkhangelsk, Vologda, Vorkuta, Kotlas, Murmansk, Petrozavodsk, Syktyvkar, Ukhta, and Cherepovets [33].

The results of studies conducted at VolRC RAS show that, currently, on Russian European North, there is a number of first and second class nodes which, due to high density of economic activity, play a major role in the economy of its entities and have further potential for the development on the basis of formation and efficient usage of agglomeration effects. Thus, sufficient high values of economic power indicators of nodal forms with agglomeration effect are typical for: Cherepovets (8061.6 million rub/km, 17th position among

50 studied Russian agglomerations (41 large and largest agglomeration, marked in the Strategy of RF spatial development, and nine REN agglomerations), Ukhta (5202.6 million rub/km, 23rd position), Murmansk (4782.8 million rub/km, 24th position), Vologda (3713.6 million rub/km, 27th position), and Arkhangelsk agglomerations (2524.7 million rub/km, 35th position), which shows significant potential for further development *(Tab. 10)*.

These territories might provide preservation of existing pivotal carcass of Russian European North and connectivity of region's space; it might stop current negative trends on the basis of reconstruction and development of sustainable socio-economic and technological connections through the system "large city–small town–village".

Important part in these processes, in our opinion, should be played by middle- and small-sized towns, the number of which is 942 units (84.6% of cities' total amount) with total population exceeding 26.5 million people (18.1% of country's total population)[16]. For most of the functions performed, small towns in the settlement process are intermediate links between a large city and a village in the settlement system.

Thus, the production sphere of many small- and middle-sized European North towns is currently based on the usage of natural resources (the timber industry is widely developed in the towns of Republic of Karelia, Arkhangelsk and Vologda oblasts, hydrocarbon production and processing – in the Komi Republic, mining industry – in the Murmansk

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[15] A number of modern works, based on rich empirical material, is devoted to the study of the role and place of "second order" agglomerations in country's spatial development. See: Dmitriev M.E., Chistyakov, A. A. Romashina. Role of spatial policy in economic growth acceleration. *Obshchestvennye nauki i sovremennost'*=Social Sciences and Contemporary World, 2018, no. 5, pp. 31–47.

[16] City classification is given according to "CI 42.13330. 2011. Set of rules. City building. Planning and development of urban and rural settlements. Updated edition CNaR 2.07.01-89", according to which middle-sized towns have 50–100 thousand people population, small-sized cities – up to 50 thousand people.

Table 10. Rating of Russian agglomerations in terms of gravity indicator (economic capacity)

Place and name of agglomeration	Power rating of interaction, *million rub/km*	Place and name of agglomeration	Power rating of interaction, *million rub/km*
1. Moscow	-*	26. Chelyabinsk	3919.6
2. Saint Petersburg	-*	**27. Vologda**	**3713.6**
3. Tyumen	33463.2	28. Ulyanovsk	3606.2
4. Perm	28509.0	29. Krasnodar	3388.2
5. Omsk	18807.2	30. Krasnoyarsk	3341.3
6. Lipetsk	16649.1	31 .Voronezh	3137.2
7. Novosibirsk	14894.8	32. Rostov	2943.1
8. Orenburg	14693.1	33. Kazan	2763.1
9. Ufa	14251.0	**34. Arkhangelsk**	**2524.7**
10. Saratov	13784.1	**35. Apatity-Kirovsk- Monchegorsk**	**2210.4**
11. Ryazan	12312.0	36. Izhevsk (Udmurtia)	2170.9
12. Kemerovo	12172.7	**37. Petrozavodsk**	**2052.9**
13. Novokuznetsk	11082.6	38. Tula	2002.2
14. Samara	9433.3	39. Barnaul	1776.8
15. Volgograd	8830.2	**40. Syktyvkar**	**1687.9**
16. Irkutsk	8488.8	41. Stavropol	1582.5
17. Cherepovets	**8061.6**	42. Astrakhan	1258.2
18. Kamskii	7513.2	43. Vladivostok	1236.6
19. Penza	7403.6	44. Kirov	1097.4
20. Yaroslavl	6277.7	**45. Kotlas**	**867.9**
21. Yekaterinburg	5922.6	46. Pyatigorsk	741.5
22. Nizhny Novgorod	5708.9	47. Makhachkala	444.4
23. Ukhta	**5202.6**	48. Khabarovsk	-**
24. Murmansk	**4782.8**	49. Tomsk	-**
25. Cheboksary (Chuvashia)	4081.9	**50. Vorkuta**	**-****

* For the Moscow and Saint Petersburg agglomerations, this indicator was not calculated due to the "blurring" of the boundaries of the agglomeration itself. At the same time, it can be assumed that these agglomerations might be leaders according to this indicator, since they concentrate the largest volume of production and have a sufficiently developed network of settlements, located close to each other.

** For the Khabarovsk and Tomsk agglomerations, the indicator was not calculated, because it includes only 3 municipalities (the Tomsk agglomeration also includes CC "Seversk", for which there is no statistical information on most indicators), which does not allow reliably calculating average gravity coefficient for the agglomeration. In Vorkuta agglomeration, calculations were also not carried out due to the fact that it includes only the city district of Vorkuta.

Note. To assess the degree of economic interaction between the municipalities included in the agglomeration, the gravity indicator (economic power of the agglomeration) was used, which takes into account the economic potential (the volume of shipment of goods and services) and the distance between the agglomeration core and the municipality center entering it:

$$G_A = \frac{\sum_{j=1}^{n}(G_{cj} \cdot f_j)}{\sum_{j=1}^{n} f_j} \ ,$$

where G_A – gravity coefficient (economic capacity) of an agglomeration A, million rub/km; G_{cj} – the index of interaction between the core of the agglomeration (i) and the municipality (j) included in this agglomeration; f_j – population of a municipal formation (except for a core of agglomeration's area), included in the agglomeration A, thousand people; n – number of municipalities (excluding a core of agglomeration) included in the agglomeration.

Sources: Voroshilov N.V. Approaches to assessing the development of agglomerations in Russia. *Problemy razvitiya territorii=Problems of Territory's Development*, 2019, no. 4 (102), pp. 40–54. DOI: 10.15838/ptd.2019.4.102.2; Uskova T.V., Voroshilov N.V., Kozhevnikov S.A. *Problems of spatial restructuring on the example of the formation and development of urban agglomerations as points of territory's growth in the context of solving development's strategic problems of Russia's European North and the Arctic zone: Research report.* Vologda, 2018. 157 p.

Oblast)[17]. Agriculture and agro-industrial complex, due to severe climatic conditions, is developed only in a few settlements, situated primarily in the Vologda Oblast.

Many of these municipalities are currently single-industry towns of the industrial periphery in a state of long depression. So, the relevant task is the search of instruments of its sanitation. Since the economic activity of many such cities has historically been based on the usage of natural resources, one of the priority ways of its further development is in the modernization and diversification of existing industries, ensuring deep processing of raw materials on the basis of neo-industrialization and the use of NTP technologies in economic activity, which will increase production efficiency, ensure broad cooperation with other links of the national and global economy [24].

Since the economic activity of many such cities has historically been based on the usage of natural resources, one of the priorities of its further development is the modernization and diversification of ongoing industries, the insurance of deep processing of raw materials on the basis of neo-industrialization, and the usage of STP technologies in economic activity. It will increase the production efficiency, and ensure broad cooperation with other links of national and global economy [26].

At the same time, strategically, the development model for these cities, in our opinion, should imply cooperative development and integration of "traditional" (industrial, mass production of large enterprises, focusing on the following factors of placement: raw materials, labor resources, sales, transport, and energy) and "new" economy (post-industrial production, including the needs of the Arctic (biotechnology, electronic industry and other

machine-building, etc.)[18]. That is why the new role is the attraction of small- and middle-sized towns (and other deep territories) as important participants of cluster projects, initiated at large regional and territorial centers and agglomerations. It will allow changing these territories into centers of regional economic development on the basis of maximum efficient usage of its competitive positions, including the solution of strategic tasks of the RF Arctic zone development [1].

It may give new impulse to the development of small-, middle-sized towns and non-urbanized territories. At the same time, it will require a qualitatively new level of infrastructural development and drastic investment decisions from the state. Meanwhile, technological chains, which are formed within this model and situated outside European North and its Arctic zone, in our opinion, should be oriented toward strengthening of economic integration with other Russian regions through "North-South" line, not integration into international chains as production of the first redistributions. It implies the necessity to organize new forms of territorial household organization in the northern environment, scientific justification of recommendations for reducing territorial disproportions between placement of "arctic" and "northern" resources and centers of its processing and consumption.

Strategically important task of small- and middle-sized towns development is, on the one hand, establishment of close cooperation with large cities-regional centers (which have functions of scientific, industrial, socio-cultural, and service center of the highest order), and, on the other hand, ensuring the maximum development of functions of

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17 Source: compiled on the basis of municipal documents and data from the website "People's encyclopedia of Russian cities and regions "My city". Available at: http://www.mojgorod.ru/cities/index.html (accessed: 28.06.2019).

18 See: The Concept of the Strategy of Spatial Development of the Russian Federation until 2030. Ministry of Economic Development of the Russian Federation. Moscow, 2016. 111 p. Available at: http://карьеры-евразии.рф/uploadedFiles/files/Kontseptsiya_SPR.pdf

organizational, economic, industrial, cultural and educational centers of rural areas.

Inclusion of small- and middle-sized cities in the economic complex of the region can be ensured, in particular, by placing there specialized industrial enterprises (placement of branches and divisions of enterprises located in the regional center and other large cities of the settlement system: for example, machine-building, radio and electric industry enterprises), scientific and scientific-production facilities (these activities might be organized as an addition to the scientific-production complex of a large city-center); cooperation of local enterprises with entities of regional economic complex.

Taking into account features of small- and middle-sized towns in settlement systems, its local conditions and resources, it is advisable to place there the following enterprises and organizations of traditional economic centers:

— which produce homogeneous industrial products in those types of economic activities, which are not influenced by the scale effect (textile industry, machine processing of metal, wood, plastics, some chemical productions);

— which use small reserves of local raw resources for production needs (for example, enterprises on production of building materials, furniture, peat enterprises, etc.);

— which process low-transportable or perishable agricultural products manufactured in rural areas;

— which perform functions of organizational, industrial-economic, and rural service centers, close to small towns (repair of agricultural machinery and transport means, sewing studios and workshops);

— which provide transit transport connections between large territorial-economic complexes or elements of one complex;

— which produce folk crafts, primarily formed on the basis of local population's skills [34].

In this environment, rural territories and village economy will receive new impulse for the development, which imply emergence of new opportunities for efficiency increase and core change in the technology of agricultural production, approximation of agricultural products processing to production, etc. [3]. At the same time, transformation of current spatial structure of household and settlement of European North requires qualitative revision of federal and regional policy's principles [35, 36]. The obtained results might be used for the development of strategy and program development of Russian European North and its constituent entities of the RF; justified forms, methods, and management tools are oriented toward the formation of a single socio-economic space of Russian European North and development of interregional integration of Russian regions according to "North-South" line.

Further prospects of the study include the development and approbation of the methodology for determining the placement of "settlement centers" (growth points of inter-settlement and interregional value, provided with infrastructure and potential for further economic development), mechanisms of increasing efficiency of interregional cooperation on the basis of the development of long added value chains; the formation of new forms of territorial organization of the Arctic and North's economy.

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Development of Growth Poles in the Russian Federation: Direct and Reverse Effects*

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Abstract. The understanding of economic polarization as one of the possible sources of economic development is rooted in a number of scientific papers and in strategic planning documents. This understanding requires the revision of the implications that emerge due to the formation and development of growth poles. The goal of our present research is to develop an approach that will help assess the impact of growth poles on the surrounding space. Scientific novelty of the work consists in the justification of an approach to the identification of direct and reverse effects of the development of growth poles, which allows us to measure the scale of the impact they have on the territories concentrated around. Theoretical and methodological basis of the study is formed by a set of scientific ideas in the field of regional economics, spatial analysis and modeling. Using the assessment of spatial autocorrelation (by determining the values of Moran's Global Index and Moran's Local Index) and the implementation of cartographic analysis, we assess the relationships between individual constituent entities of the Russian Federation according to the resulting parameters of territory development such as "permanent population" and "gross regional product". According to the calculations we prove that the influence of growth poles on the surrounding space is ambiguous: the territories located near large-scale socio-economic systems do not receive a significant impetus to their own development; moreover, they lose the resources they already have. The revealed pronounced reverse effect of economic polarization determines the importance of applying a balanced approach to the use of growth poles as a tool of economic development. The results of our research can be used in the work of public authorities at different levels and can also form the basis

for further studies related to the measurement of the effects of development of growth poles and the development of priorities and mechanisms of regional policy, taking into account the interests of the territories that surround them.

Key words: growth pole, assessment of the effect, direct effect, opposite effect, spatial autocorrelation, Moran's Index.

Introduction

The issues of spatial development management are of special interest for the Russian Federation the area of which is of considerable scope, and the characteristics of its individual territorial units are rather diverse. The importance of socio-economic space transformation is enhanced under the conditions of increasing interregional differentiation in a number of key indicators (for example, the difference between the maximum and minimum values of per capita GRP in the period from1998 to 2017 has increased from 20 to 54.8 times[1]): significant regional disparities distort space being evidence of its integrity lack.

Meanwhile, a single coherent space, the importance of which was emphasized by E.G. Animitsa, N.M. Surnina [1], E.M. Bukhval'd [2], A.I. Tatarkin [3] and other authors in their studies, may not be homogeneous: each territory has its own set of strengths and weaknesses determining the nature and efficiency of socio-economic processes within its borders, making the attempts to influence specific regions and municipal entities in an effort to align their development parameters costly and ineffective. Thus, according to N.V. Zubarevich [4] there is a need to address significant contradictions only between the social characteristics of the territories' development (while smoothing spatial economic inequality due to its being conditioned by the objective factors is impossible).

Moreover, within the concept of polarized development dominating in the regional policy carried out at the present time in Russia [2], advancing the development of certain territorial elements is perceived as a source of positive transformation of large territorial systems.

The basis of this concept is the theory of cumulative causation of G. Myrdal [5] who noted close dependencies between all the parameters of the system development; its change consequently determines the impulses transmitted by the individual system elements. Obviously, in this case national and regional development are rather divergent than convergent in nature, and a key factor is the formation of the economic leaders being the agents of positive transformation. The term "growth poles" was proposed by a French scientist F. Perroux [6] who identified them as compactly arranged and dynamically developing sectors or individual companies concentrating a "momentum of development", influencing the territorial structure of the economy and its dynamics. He also stressed the objective nature of their formation: all economic actors are initially different from each other, and the magnitude of these differences over time, only increase. F. Perroux's ideas were continued in the studies of another French economist, J. Boudeville [7], he not only outlined the conditions of the growth points emergence, but also offered to understand them as the territory

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[1] Gross regional product. National accounts. Federal State Statistics Service. Available at: https://www.gks.ru/accounts. (access date: 08.10.2019).

[2] The main priorities of spatial development of Russia identified in the Strategy of Spatial Development of the Russian Federation for the period up to 2025 (approved by Decree of the RF Government on 13.02.2019 No. 207-R).

of different scales which are the sources of innovation and economic development across the country together with enterprises and industries. The approach of F. Perroux and J. Boudeville gained quality development in the works of P. Pottier [8] who suggested that spaces connecting individual growth poles and serving as the sites for infrastructure networks, develop more intensively than other areas, becoming over time, the corridors (or axes) of development and turning into the elements of spatial framework for the country's economic growth.

In turn, the transformation of the territories that do not fall in the number of poles or axes of growth, is determined by their interaction with the leaders. Thus, T. Hagerstrand [9] considered the diffusion of innovations as the basis for synchronizing the pace of development of the regions different from one another: capital seeks from development centers to peripheral areas where resources are more accessible, thereby causing their economies to grow. This approach is reflected in the "volcano" model of H. Hirsch [10], according to which the growth pole periodically provides impulses of innovations to the surrounding territories, as a result the periphery gains access to innovations, gradually increasing its level of well-being and getting the opportunity of becoming a center of development.

Over time, the interest of researchers considering the factors of territories' transformation into growth poles has shifted to studying the opportunities of agglomeration development and the evaluation of agglomerations' role in the country's conversion (primarily the economic one): the "center-periphery" theory of J. Friedman [11], the works of H. Richardson [12] and P. Romer [13], devoted to agglomeration effects, the concept of new economic geography of M. Fujita, P. Krugman and E. Venables [14], the theory

of clusters by M. Porter [15] deserve special attention.

In the modern foreign studies the issues of heterogeneity of various territories' development also receive much attention; the authors of the research works emphasize both the difficulty of overcoming the backlog of economically weak regions and cities from the leaders [16; 17; 18; 19], and the prospects opening to the space systems the formation and development of growth poles – agglomerations, clusters [20; 21; 22]. These topics are quite popular among the Russian authors [23; 24; 25; 26], especially because the process of studying the issues of transformation of the spatial organization of the economy has a long history in domestic science (so, clusters [27] corresponding to the models of growth poles in a number of characteristics were the basis for the Soviet model of productive forces).

Such a "bilateral" approach to the prioritization of spatial transformations (on the one hand, the desire to remove a significant interterritorial imbalances, on the other hand, the formation and support of growth poles) seems contradictory, but these priorities can be combined with each other within the framework of the concept of polarized development (but only in case, if the imbalances elimination does not mean the complete removal of the differences between territories). Moreover, in theory the growth poles are able to act as an effective instrument for reducing the level of interregional differentiation (think of the model of T. Hagerstrand, H. Hirsch), that determines the emergence of a considerable number of works in the scientific literature based on the search of possibilities of applying the concept of polarized development in today's conditions [28; 29]. Despite the fact that the theory of growth poles has not lost its popularity nowadays, some researchers' evaluation of the capacity and efficiency of the

implementation of the polarized development concept in practice is somewhat controversial. For example, S.E. Dronov notes that the accelerated development of the two capitals (Moscow and Saint Petersburg) has not secured their becoming the points of growth, promoting the economic development of the surrounding areas, moreover, it has led to the increased inequality between them [30], G.F. Shaikhutdinova describes the development orientation of the individual elements of the space leading to the buildup of uneven socio-economic development of territories as the main drawback of the concept of growth poles [31, p. 40]. Indeed, the advanced development of territories which could become the economy growth points of both the country as a whole and of the individual regions and municipalities (especially those located close to them), often leads to the reverse effect: inter-territorial contrasts are only aggravated.

At the same time in the works mentioning the presence of such (direct and reverse) effects of polarized development, only the fact of their manifestation is emphasized in most cases, and the authors concentrate either on the use of benefits in the process of growth poles allocation, or in the designation of causes and consequences of the imbalances conditioned by the rapid development of economic leaders. The scale of the impact (positive or negative) they exert on the territories concentrated around them is left without proper attention. All of the above determined the choice of the study objective which is to develop an approach for assessing the impact of the growth poles on the surrounding space.

Description of the research methodology and the justification of its choice

The analysis of spatial characteristics of the socio-economic systems cannot rely only on the assessment of the extent and dynamics of individual development indicators, although it does not exclude it: the priority is the consideration of the objects' (and their aggregates') location features in the space; and the parameters of the objects proximity of to each other, their concentration in the territory, the scale of their systems become important aspects for the research.

Obviously, the simplest method of spatial development features analysis is the inter-territorial comparison of the values of the considered indicators (e.g., the identification of the ratio of the maximum and minimum values of the studied parameter, the definition of the Gini coefficient which allows to characterize the degree of differentiation of separate space elements development, etc.). The result of such comparisons is the definition of the parameters of spatial development heterogeneity which allows us to make generalized conclusions about the extent of polarization of the economy (or social sphere), but does not give a full picture of the degree of dependence between the development parameters of the more successful territories and their neighbors (inter-territorial comparison allows only to ascertain the presence or absence of failures).

Considering agglomerations (compact clusters of settlements closely connected by the economic and social flows, and implementing the effects of localization and concentration, the effects of scale of production through the interaction with each other [32]) as potential growth points provides researchers with the ability to use the whole complex of parameters to assess the extent of their development: the coefficient of agglomerations, the index of agglomerations, the coefficient of agglomeration population's development [33], etc. However, this approach allows you to focus on the growth points (and the place occupied by them in the socio-economic system of a region or country), failing to take into account the features of transformations of the territories surrounding them.

In turn, to identify the degree of connectedness of the individual space components with each other the evaluation of spatial autocorrelation can be used, which can be defined as follows: for a set S containing n geographical units, spatial autocorrelation is a correlation between the variable observed in each of the n units, and the measure of geographical proximity defined for all $n(n-1)$ pairs of items from S [34]. Thus, the analysis of spatial autocorrelation allows you to set the tightness of the relationship between the parameters characterizing the development of the territories located near to each other.

One of the most common (and easy to use) parameters of spatial autocorrelation assessment is the Moran's I index, which is presented as a methodological basis of a number of foreign studies [35; 36; 37]. Assessment of the Moran's I index involves the following steps.

The first step includes building a distance matrix containing information about the distances between all the studied territorial units (in this research, Russian regions). There are various approaches to determining values for the matrix: for example, they can be assumed as equal to zero (if the territories do not have a common border) or unit (if such a boundary exists), they can be determined based on the information about the distance in the air, on the length of roads or railway lines between the considered areas.

In the framework of this research the distance matrix was built based on the information on length of roads between administrative centers of the subjects of the Russian Federation.

The second step includes calculating the value of the global Moran's I index and determining the presence (or absence) of spatial autocorrelation.

The formula for calculating the global Moran's I index (1) is as follows:

$$I = \frac{n \sum_{i=1}^{n} \sum_{j=1}^{n} w_{ij}(x_i - \bar{x})(x_j - \bar{x})}{S_0 \sum_{i=1}^{n}(x_i - \bar{x})^2}, \qquad (1)$$

where I is the global Moran's I index, x is the indicator, S_0 is the sum of all spatial weights ($S_0 = \sum_{i=1} \sum_{j=1} w_{ij}$), n is the number of the analyzed areas.

The index values can lie in the range from -1 to 1, and its comparison with the mathematical expectation (2) allows to make a conclusion about the presence and nature of spatial autocorrelation.

$$E(I) = \frac{-1}{n-1}, \qquad (2)$$

where $E(I)$ is the mathematical expectation of the index, n is the number of the analyzed areas.

The obtained values can be interpreted in the following way. If the value of the Moran's I index exceeds the mathematical expectation, there is positive spatial autocorrelation (observation values in the adjacent territories are close to each other); if the mathematical expectation exceeds the value of the Moran's I index, we can confirm the presence of negative spatial autocorrelation (the values of the considered indicator of the territories located near each other differ). If the Moran's I index has the same value with the mathematical expectation, it indicates no spatial autocorrelation [38].

Testing the significance of the obtained results can be carried out using the traditional econometric method of statistical testing of hypotheses (z-test), which is carried out by determining the value of Z-statistics (3).

$$z - statistics = \frac{I - E(I)}{\sqrt{E(I^2) - E(I)^2}}, \qquad (3)$$

where I is the global Moran's I index, $E(I)$ is the mathematical expectation of the index.

This value shows how many standard deviations the actual value of the Moran's I index is removed from the expected value. The

higher is the value, the less likely it is that the actual pattern is random.

The third step is the calculation of the values of local Moran's I index and the determination of the closeness of the relationship between the individual territories.

The local Moran's I index allows to identify the presence and nature of the relationship of a particular territory with all the others [39]. The calculation of its value may be carried out using the formula (4):

$$I_{L_i} = z_i \sum w_{ij} z_j \; , \qquad (4)$$

where I_{L_i} is the local Moran's index for the *i-th* territory, w_{ij} is a standardized distance between the *i-th* and *j-th* territories, z_i and z_j is the standardized values of the studied parameter for the *i-th* and *j-th* territories.

The obtained values can vary from -1 to 1, and the logic of their interpretation coincides with the logic of the evaluation the values of the global Moran's I index.

Separate parts of the local index (5), the values of which characterize the strength of interaction between two specific territories may also be of interest:

$$LISA_{ij} = z_i z_j w_{ij} \; , \qquad (5)$$

where $LISA_{ij}$ is the force of interaction between the *i-th* and *j-th* territories, w_{ij} is a standardized distance between the *i-th* and *j-th* territories, z_i and z_j is the standardized values of the studied parameter for the *i-th* and *j-th* territories.

The fourth step involves the grouping of the territories in accordance with the ratio of characteristic standardized values of the considered indicator and the values of spatial factor (which allows us to determine the place of each territorial unit in the spatial system, identify its leaders, extreme points and the peripheral area, to implement spatial clustering).

If you combine the standardized values of the estimated measure (z) with its spatially weighted centered values (w_z) for each of the analyzed territory in the same coordinate system, we can see that the points (describing the territorial units) are localized in one of four quadrants [40].

For the territories characterized by relatively high values of the considered indicator and neighboring the territories having similar values of the considered parameter, the values of z and w_z will be positive (HH quadrant – extremums). Negative values of z and w_z (LL quadrant) indicate that the territories are located close to the entities similar in magnitude of the analyzed sector, and the value of the considered parameter is relatively low. If the value z is positive and w_z is negative (HL quadrant), the territory differs from its neighbors being ahead of them by the estimated parameter. If, on the contrary, z is negative and w_z is greater than zero (LH quadrant), the territory is behind its neighbors. Thus, the territories with positive autocorrelation fall within the HH and LL quadrants, if the autocorrelation is negative, they fall within HL and LH quadrants. To visualize the outcomes of the calculations better it is possible to use the cartographic methods of representation helping to render the clusters of the subjects of the Russian Federation which have fallen into different groups (quadrants) as well as to highlight the regions influencing each other most strongly.

Thus, the evaluation of spatial auto-correlation allows not only to identify the inter-relationship between the individual territories, but also to measure it, identify the leaders (not only by development scale but also from the point of view of the strength of their impact on neighbors) and the outsiders. Based on the "classic" conception of the growth poles nature (suggested in the interpretations of F. Perroux and J. Boudeville), it can be assumed that their

key characteristics are, on the one hand, the high level of development that allows them to stand out among other subjects, on the other hand, the importance of their impact on the development of other socio-economic systems (the entire socio-economic system as a whole). In the context of the above approach to the territories grouping (based on the calculations of the Moran's I index) the potential growth poles are the entities within HH and HL groups (they are characterized by quite high values of the considered indicators) and having substantial values of the local Moran's I index (I_{L_i}) at the same time, indicating a close relationship between their development and the development of other territories. In this regard, it makes sense to divide each group of the regions allocated in the framework of further analysis into two parts (in accordance with the parameters of the local Moran's I index these are the territories that get into it, the regions which are most closely related to other entities are of particular interest), although this division is not always possible in practice (there may be a situation when there will be no regions the development of which is significantly associated with the development of other participants in the economic system within the group).

The results of the study, analysis and explanation

In order to determine how growth poles effect on the surrounding space, such figures as "permanent population" and "gross regional product" were analyzed[3]. Their choice is dictated by the fact that both indicators can be considered as a result parameter of the territory's development. Thus, the value of the gross regional product shows the scale of economic activity carried out in the region, and will depend on the success of its implementation. In turn, the distribution of population in the country space is a

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[3] The data of 2017–2018 were analyzed.

consequence of the aggregate of complex demographic and socio-economic processes and patterns largely determined by the success of individual territorial systems development.

Assessment of spatial autocorrelation conducted on the basis of the analysis of data on the population in the Russian regions, suggests a direct connection between the values of this indicator in the territories close to each other. Such conclusions are possible due to the comparison of the values of the global Moran's I index (0,020) calculated using the formula (1) with its mathematical expectation (-0,012), to determine which the formula (2) was used. This means that changing the value of the examined indicator (the population) in the transition from region to region is gradual. While the two "leaders", the growth poles are clearly observed (Moscow and the Moscow Oblast), which are not only characterized by high population, but also have a significant impact on the surrounding regions: the points representing them are much to the right of the main array (*Fig. 1*).

The largest share in the total number of the regions is occupied by the territories with negative autocorrelation (LH group) − with low values of the considered indicator surrounded by territories where the population is relatively high (*Tab. 1*). Almost all the regions included in this group and is characterized by strong intra-regional links are located close to Moscow (and Moscow Oblast).

Extremums are the regions in HL group having a significant value of the considered indicator (compared to the neighboring regions), characterized by very low values of the local Moran's I index so that we could speak about a significant impact on the surrounding territory on their part.

Another group of the regions having relatively high population values (but differing by positive autocorrelation) is HH group. These are the territories comparable with the sur-

Figure 1. Spatial Moran scatterplot for subjects of the Russian Federation (the permanent population)
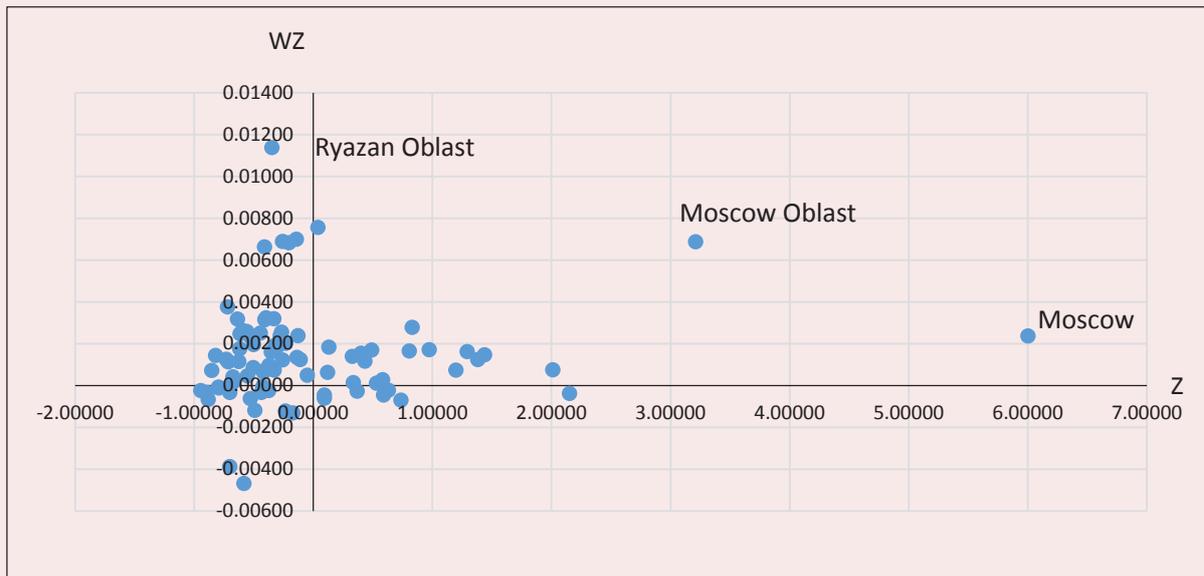
Based on: Regions of Russia. Socio-economic indicators. 2018: stat. coll. Rosstat. Moscow, 2018. Pp. 39-42.

rounding regions by the values of the conside-red indicator. They represent the elements of the area of the country's population concen-tration. The maximum values of the local Moran's I index are characteristic for the representatives of this very group, Moscow and the Moscow Oblast (already noted earlier). However, it should be noted that positive values of the index for these territories are related to their proximity to each other (with a substantial population in each of the regions), whereas the relationship with the surrounding territories is reverse.

LL group (the regions not experiencing the influence from the subjects surrounding them which are the objects of the study, and are not the leaders either) includes mainly the Far East and southern part of the country.

The calculations (and also the graphic display of the regions' grouping in accordance with their role in the national settlement system, presented at *Fig. 2*) indicate the presence of correlation between the indicators of the population residing in the neighboring

territories. At the same time, the analysis of the closeness of the relationships (within the given parameters) between the regions shows that only the impact of the complex including Moscow and the Moscow Oblast on the surrounding territories can be called significant.

Meanwhile all connections linking Moscow with the regions belonging to the area of significant impact of the leading territories, and shown with lines in Fig. 2 are reversed. This means that capacity building of Moscow (and the Moscow Oblast) in the long run will not lead to amplification of the related regions (located around the Moscow Oblast), on the contrary, it will result in an outflow of resources available to them.

The validity of this thesis is also confirmed by a retrospective analysis: the evaluation of population change in the Russian regions over a sufficiently long period (60 years) indicate that the regions located in the European part of the country neighboring the Moscow Oblast are leading in the pace of population decline: some of them lost more than a third of their

Table 1. Groups of subjects of the Russian Federation, having different positions in the national settlement system*

The subject of the Russian Federation	I_{L_i}	The subject of the Russian Federation	I_{L_i}
LH		**HH**	
Ryazan Oblast	*-0.0040*	*Moscow Oblast*	*0.0221*
Kaluga Oblast	*-0.0027*	*Moscow*	*0.0143*
Republic of Adygea	*-0.0027*	Nizhny Novgorod Oblast	0.0023
Novgorod Oblast	*-0.0020*	Sverdlovsk Oblast	0.0021
Tver Oblast	*-0.0018*	Republic of Bashkortostan	0.0021
Republic of Mari El	*-0.0016*	Rostov Oblast	0.0017
Kostroma Oblast	*-0.0015*	Chelyabinsk Oblast	0.0017
Oryol Oblast	*-0.0014*	Saint Petersburg	0.0015
Vladimir Oblast	*-0.0014*	Samara Oblast	0.0013
Tambov Oblast	*-0.0013*	Republic of Tatarstan	0.0009
Ivanovo Oblast	*-0.0013*	Perm Krai	0.0008
Republic of Mordovia	*-0.0012*	Saratov Oblast	0.0006
Republic of Kalmykia	-0.0012	Volgograd Oblast	0.0005
Smolensk Oblast	-0.0011	Voronezh Oblast	0.0005
Pskov Oblast	-0.0011	Leningrad Oblast	0.0003
Lipetsk Oblast	-0.0011	Orenburg Oblast	0.0002
Tula Oblast	-0.0010	Novosibirsk Oblast	0.0002
Kurgan Oblast	-0.0010	Omsk Oblast	0.0001
Sevastopol	-0.0009	Kemerovo Oblast	0.0001
Karachay-Cherkess Republic	-0.0008	Altai Krai	0.0000
Other subjects of the Russian Federation			
LL		**HL**	
Republic of North Ossetia-Alania	*0.0027*	Krasnodar Krai	-0.0008
Republic of Ingushetia	*0.0027*	Republic of Dagestan	-0.0005
Kabardino-Balkar Republic	0.0006	Stavropol Krai	-0.0003
Jewish Autonomous Oblast	0.0006	Krasnoyarsk Krai	-0.0001
Amur Oblast	0.0003	Irkutsk Oblast	-0.0001
Magadan Oblast	0.0003	Republic of Crimea	-0.0001
Khabarovsk Krai	0.0003	Primorsky Krai	0.0000
Sakhalin Oblast	0.0002		
Chechen Republic	0.0002		
Chukotka Autonomous Okrug	0.0002		
Republic of Sakha (Yakutia)	0.0001		
Zabaykalsky Krai	0.0001		
Kamchatka Krai	0.0001		
Republic of Buryatia	0.0000		
* In bold italics are the subjects of the Russian Federation having strong inter-territorial links with the surrounding territories (the value of the local Moran's I index for them taken modulo exceeds the modulus of the average value of the calculated local Moran's I indices). Based on: Regions of Russia. Socio-economic indicators. 2018: stat. coll. Rosstat. Moscow, 2018. Pp. 39-42.			

human resources during the period under review (*Tab. 2*). The extent of population reduction in the central part of the country in the long term is not inferior to the parameters of the existing human capital loss in the Far East territories the global nature of which much is described in the scientific literature [41; 42].

It is obvious that the currently observed processes of socio-economic space "contraction" to single points referred to by such researchers as A.I. Tatarkin [3] and N.V. Zubarevich [43] are characteristic not only for the Central part of the country. However, the Moscow region's role in these processes is the most significant: in recent

Figure 2. The influence of the subjects of the Russian Federation on each other (indicator – resident population)

Extremums of the settlement system (loosely related to the neighboring territories) – HL

Elements of the area of population concentration closely related to the neighbors – HH

Elements of the area of population concentration poorly related to the neighbors – HH

The strongest interterritorial relations

Territories that are significantly affected by the growth poles – LH

Territories that are weakly affected by the growth poles – LH

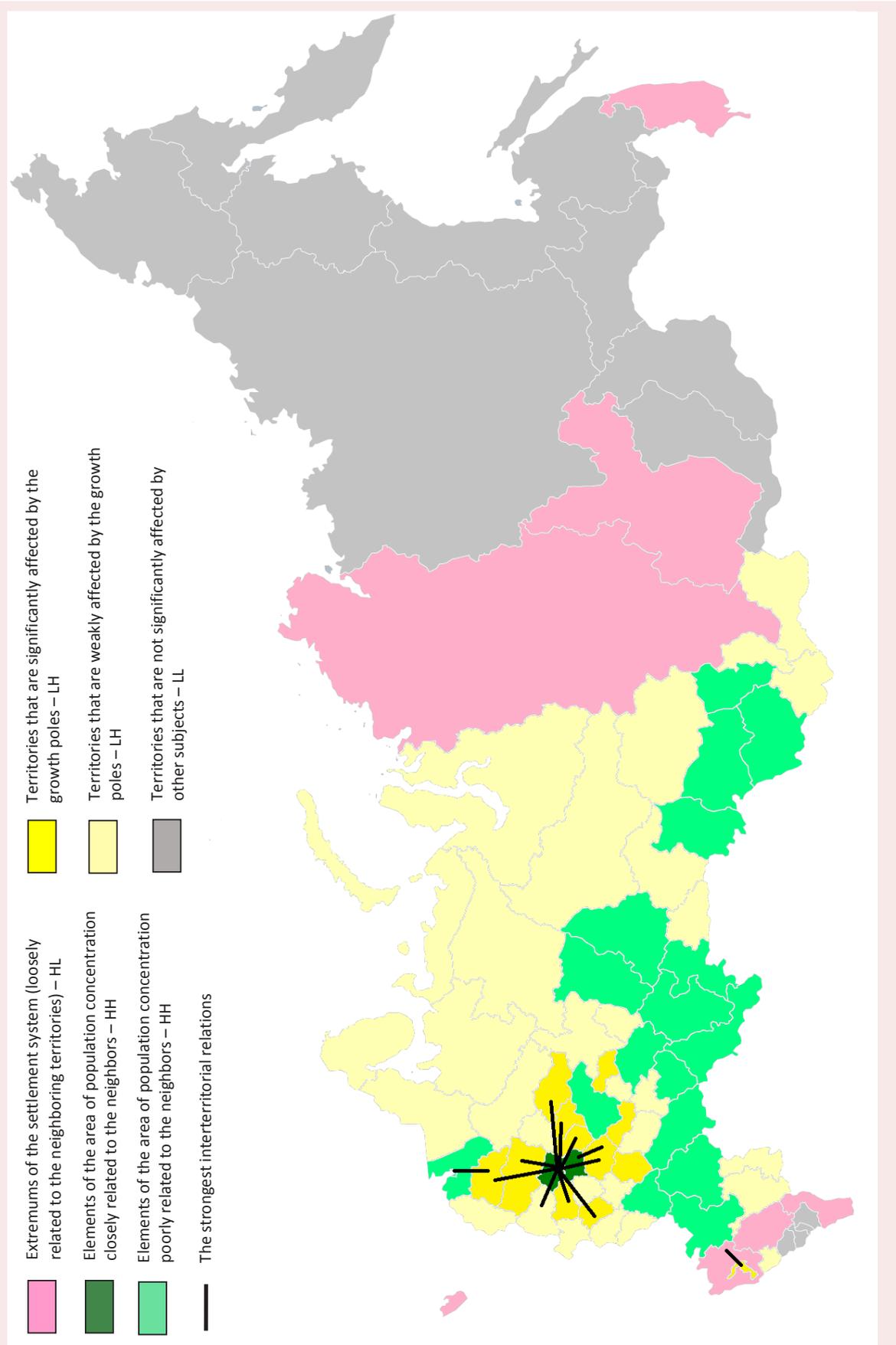Territories that are not significantly affected by other subjects – LL

Table 2. The regions with the highest rates of population decline*

No.	The subject of the Russian Federation	Population, thousand people		Population decline rate, %
		1959	2019	
1.	*Tambov Oblast*	1549	1016	34.41
2.	*Pskov Oblast*	953	630	33.93
3.	*Kirov Oblast*	1886	1272	32.55
4.	*Kostroma Oblast*	921	637	30.81
5.	*Tver Oblast*	1805	1270	29.66
6.	*Kursk Oblast*	1483	1107	25.35
7.	Magadan Oblast	189	141	25.27
8.	Sakhalin Oblast	649	490	24.56
9.	*Tula Oblast*	1918	1492	22.90
10.	*Ryazan Oblast*	1445	1122	22.89
11.	*Bryansk Oblast*	1550	1211	22.57
12.	*Ivanovo Oblast*	1288	1015	22.04

* In bold italics are the subjects of the Russian Federation, bordering the Moscow Oblast or located close to it.
Based on: Demographic Yearbook of Russia. 2002: stat. collection. Goskomstat of Russia. Moscow, 2002. Pp. 22-24; Federal state statistics service. URL: http://gks.ru (date accessed: 24.10.2019).

decades, a steady increase in the proportion of people living in 15 major cities is recorded, while the total number of their inhabitants for the period from 1989 to 2018 increased by 16%, the number of inhabitants living in Moscow increased by almost 40% for the same period[4]. As noted in the researches of Zh.A. Zaionchkovskaya and G.V. Ioffe, since 1960 migration has been the main growth driver of the population of Moscow and the Moscow Oblast (even though its actual magnitude exceeds the officially recorded numbers) [44]. It should also be noted that, according to experts-demographers, "the attraction of large Moscow and the Moscow Oblast extends to the whole CIS region, but despite this their migration gain three-quarter consists of the arrivals from the Russian regions up to the Far East" [45].

At the same time the greatest strength of attraction of Moscow and the Moscow region is felt by the nearby entities. According to the results of a study conducted by Strelka Mag editorial board (issued by the Institute for media, architecture and design "Strelka" specializing in urbanism and urban development) together with the Socialdatahub company, the rating of Russian cities the residents of which often move to Moscow was built[5]. It was headed by Saint Petersburg, Yekaterinburg and Nizhny Novgorod, and Ryazan and Tula located near the Moscow region though entered the Top 20, only took 16 and 19 places, respectively. However, if you count the values used to rank municipalities that characterize the number of residents who moved to Moscow in the relative form (specifying their ratio to the total number of people living in these cities), we can see that the performance of Ryazan (4%) and Tula (3.6%) is higher than parameters of Saint Petersburg (3.1%), Yekaterinburg (2.9%) and Nizhny Novgorod (3.2%).

The parameters of spatial autocorrelation, identified on the basis of estimates of gross regional product, are somewhat different

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[4] Population of the USSR. According to the all-Union census of 1989. Goskomstat of the USSR. Moscow: Finance and statistics, 1990. 45 p.; Database of indicators of municipalities. Federal State Statistics Service. Available at: http://gks.ru/free_doc/new_site/bd_munst/munst.htm (date accessed: 05.10.2019).

[5] Capital drift: which cities often move from to live in Moscow. *Strelka Mag*. Available at: https://strelkamag.com/ru/article/stolichnyi-dreif-iz-kakikh-gorodov-priezzhayut-zhit-v-moskvu (accessed: 18.12.2019).

from the previously defined characteristics of the tightness of the relationship between the values of the "permanent population" indicator inherent in the considered subjects of the RF. The value of the global Moran's I index (-0.001) is less than its mathematical expectation, which allows to conclude that a negative autocorrelation (the outcomes of z-test confirm the significance of the results). This means that changing the values of the considered parameter when moving between the regions occurs "abruptly", and the difference between the volume of GRP of neighboring territories is typically quite substantial.

At the same time there is a lot in common between the spatial distributions of population and the amounts of the produced product. Thus, strong leaders on the value of the evaluated indicator having the closest ties with their neighbors are again Moscow and the Moscow Oblast (*Fig. 3*), and the

territories surrounding them lead in LH group (the regions which are characterized by negative autocorrelation and low values of GRP).

However, high values of the local Moran's I index are characteristic only for the 19 subjects of the Russian Federation (*Tab. 3*), which means that they have strong enough relationships with the neighboring regions. The leaders among them (on the value of the considered indicator) along with the already noted earlier are Saint Petersburg and Krasnodar Krai (however, the extent of the closeness of their relationship with the surrounding territories significantly inferior to the parameters of connectedness of Moscow (and the Moscow Oblast) with the neighboring regions).

Analysis of locations of the regions in different groups (HH, HL, LH, LL) in the country (*Fig. 4* and *5*) attests to the high degree

Figure 3. Spatial scattering diagram of the Moran's I index for the subjects of the Russian Federation (gross regional product)
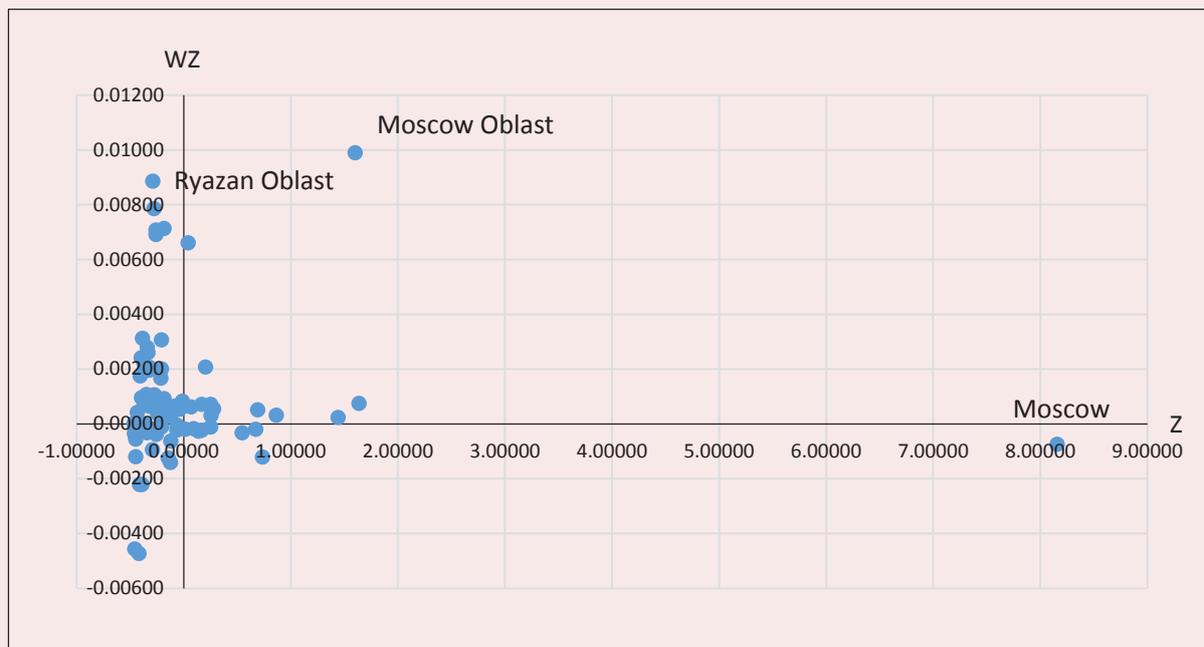
Based on: Regions of Russia. Socio-economic indicators. 2018: stat. coll. Rosstat. Moscow, 2018. Pp. 458-459.

Table 3. Groups of subjects of the Russian Federation allocated in accordance
with the parameters of spatial autocorrelation (indicator – gross regional product)*

The subject of the Russian Federation	I_{L_i}	The subject of the Russian Federation	I_{L_i}
LH		**HH**	
Ryazan Oblast	-0.0026	Moscow Oblast	0.0159
Tver Oblast	-0.0022	Saint Petersburg	0.0012
Kaluga Oblast	-0.0019		
Vladimir Oblast	-0.0018		
Tula Oblast	-0.0013		
Ivanovo Oblast	-0.0012		
Kostroma Oblast	-0.0010		
Novgorod Oblast	-0.0010		
Smolensk Oblast	-0.0009		
Oryol Oblast	-0.0008		
Pskov Oblast	-0.0007		
LL		**HL**	
Republic of Ingushetia	0.0021	Moscow	-0.0060
Republic of North Ossetia-Alania	0.0020	Krasnodar Krai	-0.0009
Kabardino-Balkar Republic	0.0009		
Chechen Republic	0.0009		

* The table presents only those subjects of the Russian Federation, which have the most strong interterritorial ties with the surrounding territories (their values of the local Moran's I index taken modulo exceeds the modulus of the average value of the calculated local Moran's I indices).

Based on: Regions of Russia. Socio-economic indicators. 2018: stat. coll. Rosstat. Moscow, 2018. Pp. 458-459.

of polarization of economic activity in the European part of Russia. The obtained results can be interpreted as follows.

Most of the Siberia regions although characterized by highly significant values of the considered indicator, are poorly connected with the surrounding territories (this is largely due to the significant distances between the centers of economic activity of these subjects of the Russian Federation). The Far East and parts of Southern Russia do not experience a significant impact from their neighbors (the near-border location of these regions causes the need for analysis of the extent of their relationship with the neighboring foreign countries and regions as it is possible that they may fall within the zone of influence of the economic development extremums beyond the borders of the Russian Federation), and the Ural regions characterized by quite high values of GRP (mainly autonomous district) have (within the framework of the considered parameter) closer relationship with Moscow than with each other (as evidenced by the results of the calculations of LISAij indicators values defined for the regions of the Urals and Moscow). This regularity is confirmed by the results of the analysis of statistical data characterizing the interregional trade flow. Thus, the trade turnover of the Tyumen Oblast (including Khanty-Mansi and Yamalo-Nenets Autonomous okrugs) with Moscow is more than 4 times greater than trade with the Sverdlovsk Oblast, more than 10 times with the Chelyabinsk Oblast, more than 160 times with the Kurgan Oblast[6]. Moscow also takes leading position in the structure of the interregional trade turnover of the Chelyabinsk Oblast (although the share of the Sverdlovsk Oblast

[6] Interregional trade flow of UFD. Investment portal of the Sverdlovsk Oblast. Available at: http://invest-in-ural.ru/img/%D0%A3%D1%80%D0%A4%D0%9E.pdf (accessed: 02.10.2019); Department of national policy and interregional relations of the city of Moscow. Department of interregional relations. Official website of the Moscow mayor. Available at: https://www.mos.ru/depnpol/function/deiatelnost/otdel-mezhregionalnykh-svyazei/ (accessed: 02.10.2019).

Figure 4. The influence of the subjects of the Russian Federation on each other (indicator – gross regional product; direct inter-territorial ties are displayed)

Extremums of the analyzed system (strongly related to the neighboring territories) – HL

Extremums of the analyzed system (weakly related to the neighboring territories) – HL

Elements of the area of GRP concentration strongly related to the neighbors – HH

Elements of the area of GRP concentration weakly related to the neighbors – HH

The strongest direct interterritorial relations

Territories that are significantly affected by the growth poles – LH

Territories that are weakly affected by the growth poles – LH

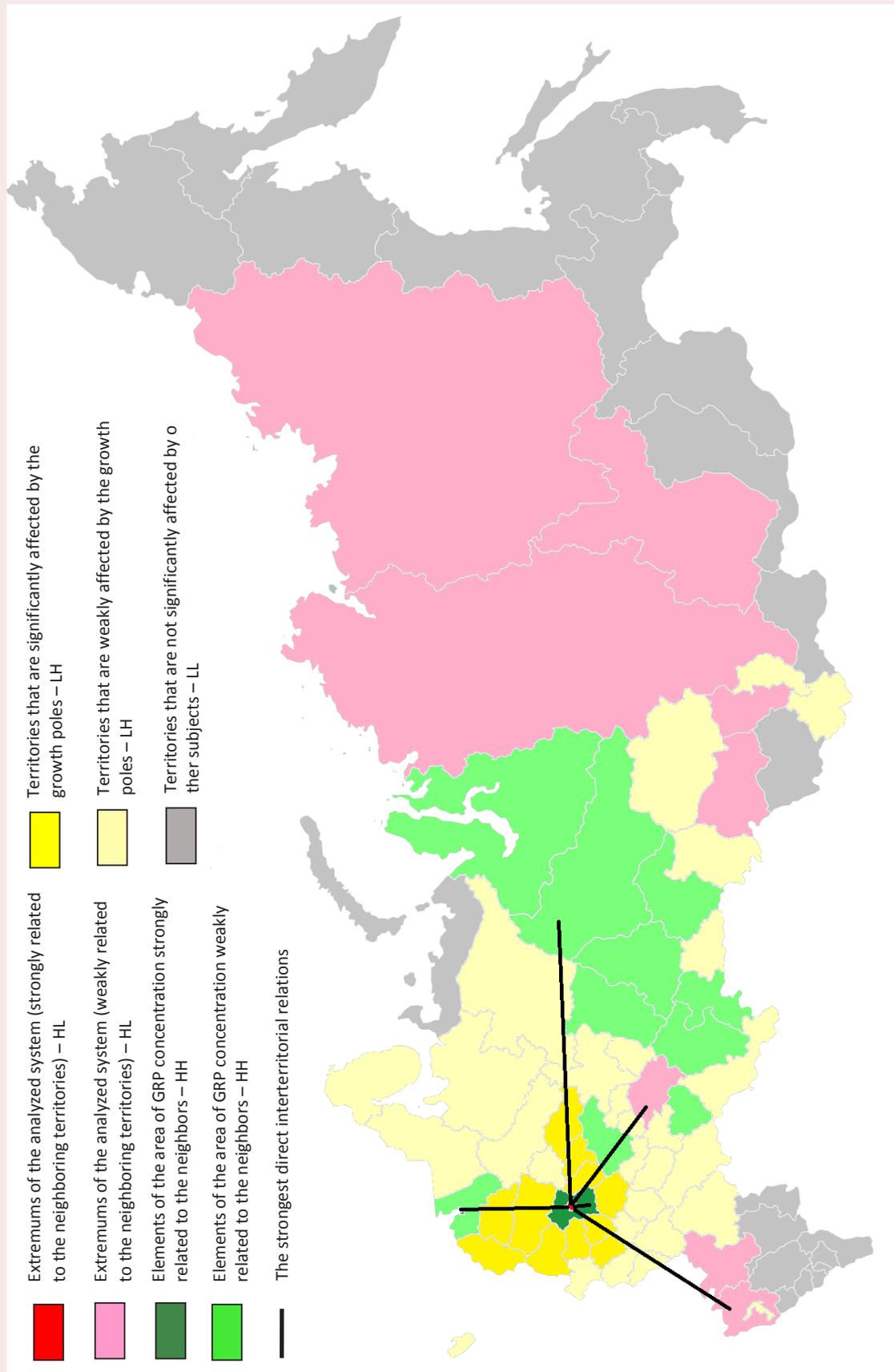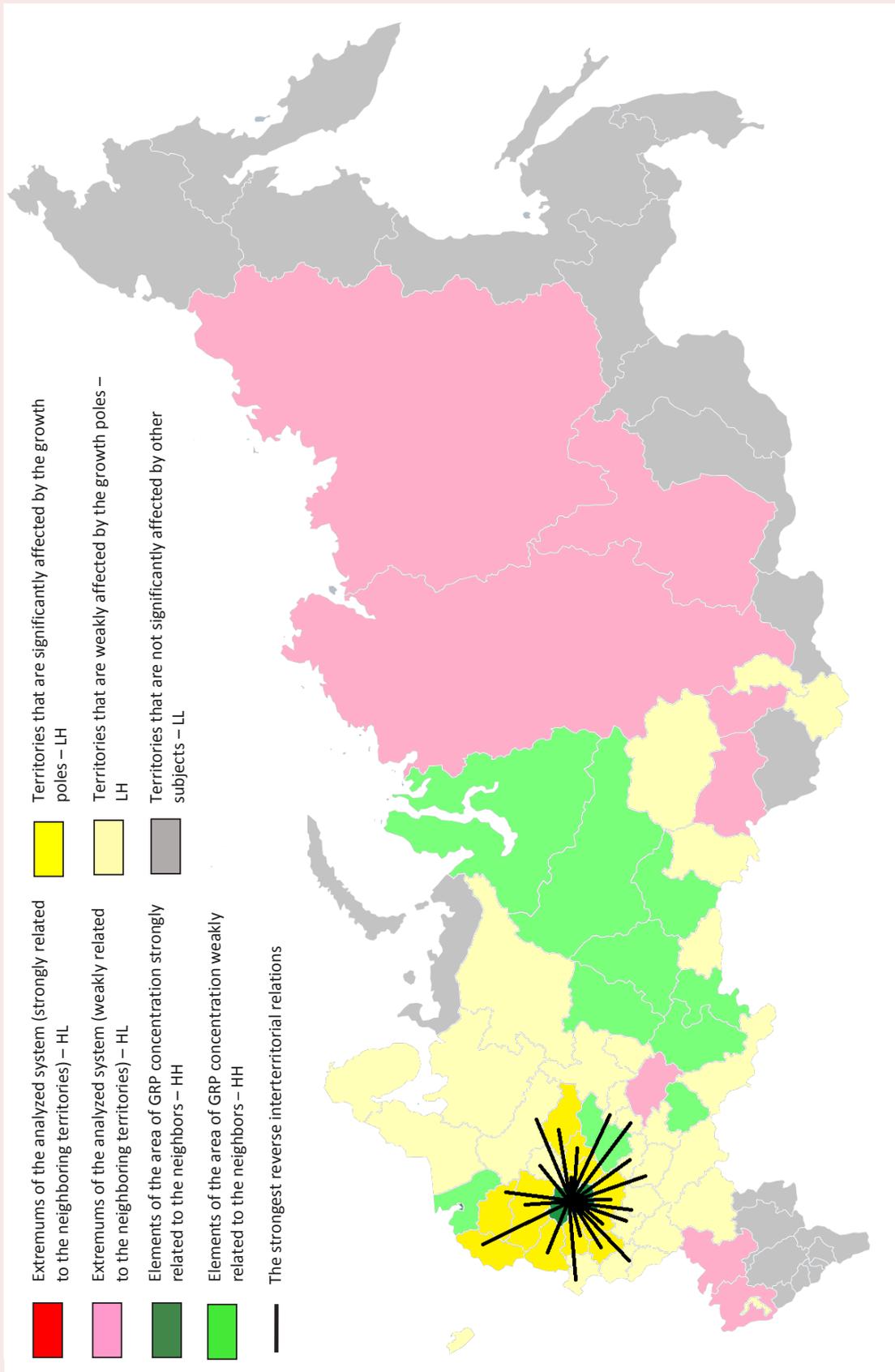Territories that are not significantly affected by o ther subjects – LL

Figure 5. The influence of subjects of the Russian Federation on each other (indicator – gross regional product; reverse inter-territorial ties are displayed)

Extremums of the analyzed system (strongly related to the neighboring territories) – HL

Extremums of the analyzed system (weakly related to the neighboring territories) – HL

Elements of the area of GRP concentration strongly related to the neighbors – HH

Elements of the area of GRP concentration weakly related to the neighbors – HH

The strongest reverse interterritorial relations

Territories that are significantly affected by the growth poles – LH

Territories that are weakly affected by the growth poles – LH

Territories that are not significantly affected by other subjects – LL

and Yamalo-Nenets Autonomous Okrug is quite high) [46, p. 839]. A bit different situation has developed in the Sverdlovsk Oblast: A.A.Glumov in his study of economic relations of the Ural territories notes [47] that the Chelyabinsk Oblast is ahead of Moscow in terms of trade turnover size with the region; moreover, if you combine the statistics on the South of the Tyumen Oblast and the autonomous districts constituting it, Moscow will take only third place in the resulting structure of trade and economic relations of the Sverdlovsk Oblast. At the same time, the "gravity" of the Urals Northern territories to the administrative center of the country is not in doubt: the similarity of economies scale and the prospect of markets determines the high interest of the territories in each other. It's no coincidence that an approach whereby not a geographical, but an "organized" proximity (based on the similarities, the belonging to a single relations system) gains special attention when determining the prospects of the subjects' successful cooperation, gets spread in the scientific literature [48]. In turn, the entities considering the neighboring regions as potential markets for manufactured products recognize that the level of inter-territorial cooperation between the Ural regions is not high enough; this factor leads to the activation of their attempts to strengthen interregional integration: in 2019, at the initiative of the representatives of the industrial complex of the Urals Federal district the Expert Council of the UrFD[7] was formed to facilitate the development of cooperation between the territories of the district and to bring business, power structures and scientific community together.

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[7] Prospects of development of industrial cooperation between the regions of the Ural Federal district was discussed in Yekaterinburg / Official website of the government of the Sverdlovsk Oblast. Available at: http://midural.ru/news/list/document148582/ (accessed: 15.07.2019).

Continuing the explanation of the results received in the course of the study it should be noted that the strongest direct interregional ties of the economic leader (Moscow) with other areas are "remote" in nature: the regions directly affected by the growth pole's development are separated geographically from them (the only exception is the Moscow Oblast). The subjects of the Russian Federation located near the Moscow region are also under its significant influence, but the nature of the observed relationships (see *Fig. 5*) does not allow to conclude about the presence of direct relation between their economic development. At the same time the presence of strong reverse interterritorial relations with Moscow is characteristic for all territories "girdling" the Moscow region.

Conclusion

The methodological approach used in the research certainly has its limitations (it allows to identify the relationship between the territories on the basis of only their locations and magnitude values of the considered index), besides, only two variables were analyzed in this research. Consideration of additional parameters, as well as the change in the study scope (e.g., the transition to the municipal level) would allow to reveal a greater number of patterns, to identify other growth poles and clusters (however, it should be noted that the process of identifying development centers and assessing their prospects is extremely challenging and cannot only be based on the method of spatial autocorrelation which was used as a methodological basis for this study). At the same time, the work done makes it possible to offer a few theses.

The impact of territorial leaders, growth poles, on the surrounding space can be very ambiguous. The calculations have proved that the proximity to the advanced socio-economic systems that (in accordance with the theory of diffusion of innovation) should generate pulses

of development to their neighbors not only deprives the regions of significant advantages, but also causes the large-scale outflow of resources only exacerbating the existing problems. Dynamic conversion of growth poles determines the need for a significant amount of additional resources coming from the outside (close neighbors are primarily the source of these resources). This allows a critical approach to some aspects of the theories of polarized development and diffusions of innovation: one cannot argue that the emergence in the socio-economic environment of the subjects leading in their development the surroundings and stimulating economic growth of large-scale systems (e.g. the national economy) will have a positive impact on all elements of the economic complex, their effects on the immediate neighbors will be rather negative.

In this regard the simultaneous solution of such problems of the spatial development Strategy of the Russian Federation for the period up to 2025 as "reduction of regional disparities in socio-economic development of the subjects of the Russian Federation, and also reduction of intra-regional socio-economic disparities" and "ensuring the expansion of the geography and economic growth, scientific-technological and inno-vative development of the Russian Federation due to socio-economic development of the most promising centers of economic growth", is quite a challenging task. This does not mean that the territories surrounding the capitals, the administrative centers and the leaders of economic development are to be doomed. Rather, we should consider that the formation of (development support) growth poles is not a universal remedy the use of which would provide the solution to all problems, and the territories adjacent to the leaders need special attention when implementing the polarization of the economy. Development of priorities and mechanisms for balanced regional policies that would take into account both the interests of the national economy and possibilities of transformation of the territories adjacent to growth points is a promising topic for further research.

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BRANCH-WISE ECONOMY

Sectoral and Territorial Specifics of Value-Added Chains in Russia: the Input-Output Approach*

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Abstract. This paper shows the growing role of domestic demand in the development of the modern economy. We consider the capacity of domestic markets of the largest countries of the world. We prove that the low volume of domestic demand inhibits economic dynamics and worsens the quality of socio-economic development of the Russian Federation. We consider that a promising direction for expanding domestic consumer and investment demand is the implementation of state policy to increase the incomes of the population, companies and the state in the framework of lengthening their own value-added chains that produce goods and services for final use. In this regard, the goal of this study is to analyze the existing value-added chains, assess the degree of their fragmentation, sectoral and territorial specifics. The input-output theory serves as a methodological basis for our study. The information source is represented by basic input-output tables and the data of the Unified Interdepartmental Statistical Information System. The novelty of the research consists in adjusting the multidisciplinary approach to the assessment of fragmentation of production to suit the needs of the regional level and in identifying modern patterns in the functioning of Russian value-added chains on the basis of the approbation of the approach on the materials of Russian regions. According to the results of the calculations we reveal the average position of 125 branches of the Russian economy in the supply and sales chains. We substantiate the degree of fragmentation of production chains of various industries; we substantiate the factors that determine the

length of a production process. We calculate the average distance along the sales chain, which the goods cover to the moment of their use by the end consumer. We consider regional fragmentation of production in Russia. We reveal a number of statistically significant dependencies between the position of regions in the value-added chains and their socio-economic development performance.

Key words: value-added chains, input-output tables, fragmentation of production, length of the production chain, distance to the end user.

1. Introduction

Modern global economy becomes fragmented and multipolar. There is a process of globalized paradigm. Due to objective reasons (decentralization of global management, reduction of production costs as a result of digitalization, development of robotics, etc.), it becomes economically more profitable to produce goods in close proximity to the consumer, rather than transport them around the world from low-cost countries. Production moves to countries of consumer demand, countries with a developed domestic market.

In terms of the capacity of the domestic market, Russia is significantly inferior to a number of other countries (USA, China, India, Japan) and the European Union *(Tab. 1)*. Per capita aggregate domestic demand according to purchasing power parity (PPP) in Russia is 2.6 times lower than in the United States and 2 times lower than in Germany[1].

The small capacity of the domestic market is one of the main factors constraining economic development. It leads to under-consumption of goods and services by the population, reduction of enterprises' incentives to increase production and deepen the processing of raw materials. The result was lack of domestic demand for many types of products, export of low-tech goods. This situation is worsened by the spiraling development of the economy: due to lost value added, incomes of companies, state, and population decline. This leads to a decrease of consumers' demand and investment opportunities.

Table 1. Total domestic demand in 2017 (without PPP)

	Final consumption		Gross accumulation		Total domestic demand	
	Volume, trillion USD	Share, % from total	Volume, trillion USD	Share, % from total	Volume, trillion USD	Share, % from total
Global	59.296	100.0	20.184	100.0	79.481	100.0
USA	16.053	27.1	3.986	19.7	20.038	25.2
EU	13.129	22.1	3.497	17.3	16.626	20.9
China	6.468	10.9	5.169	25.6	11.637	14.6
Japan	3.653	6.2	1.158	5.7	4.811	6.1
Germany	2.672	4.5	0.750	3.7	3.422	4.3
India	1.857	3.1	0.760	3.8	2.617	3.3
Russia	1.117	1.9	0.353	1.7	1.470	1.8
Source: own calculations based according to World Bank data.						

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[1] Total population of Russia is 146.8 million people, U.S. − 325.1 million people, Germany − 82.8 million people. Conversion coefficient PPP (GDP) for Russia is 0.42, for the U.S. − 1, for Germany − 0.85. Accordingly, the total domestic demand per capita for PPP in Russia is equal to 24.0 thousand USD, in the U.S. − 61.6, in Germany − 48.6 (calculations based on World Bank data).

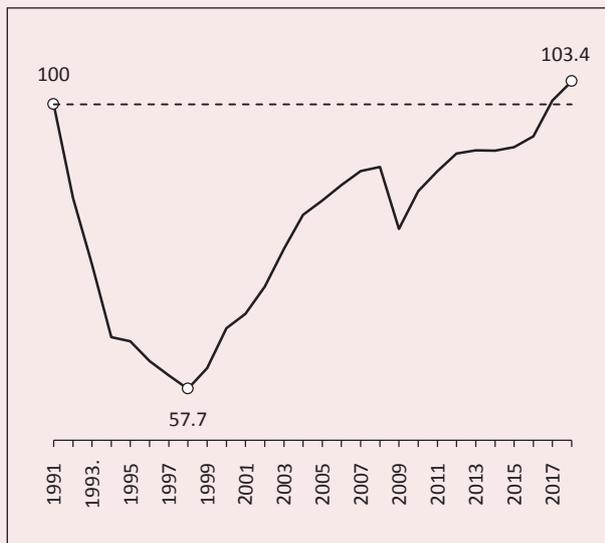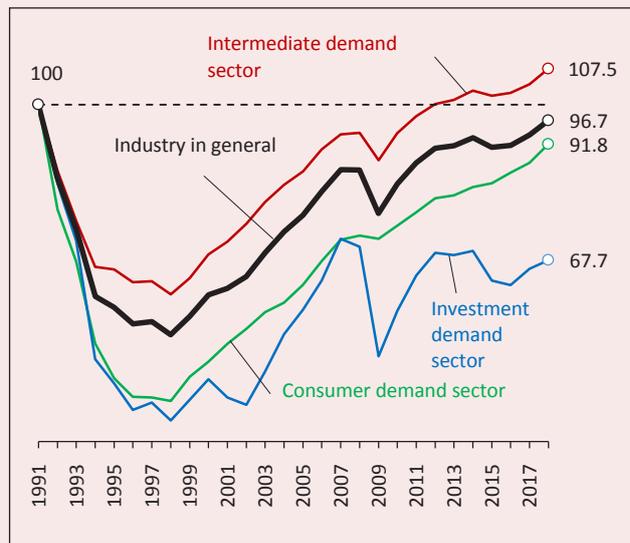Figure 1. Dynamics of transport cargo turnover in Russia in 1991–2018, % to 1991

Figure 2. Dynamics of industrial production in Russia in 1991–2018, % to 1991

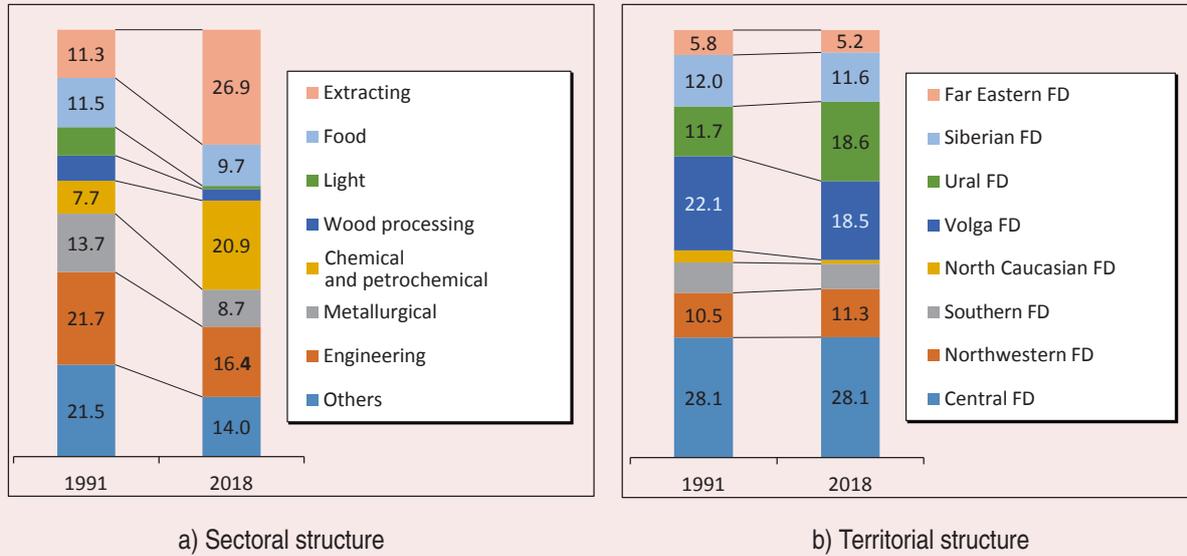Source: calculated according to Rosstat data.

In the process of the Russian economy's reformation, a significant part of existing Soviet economic ties between regions was destroyed. The share of interregional turnover in country's GDP decreased from 25% to 16% in 1990–1994 [1]. The revival of interregional ties is slow. It became possible to restore the volume of transport cargo turnover only in 2017 (*Fig. 1*), the volume of industrial production is still inferior to the level of 1991 (*Fig. 2*). At the same time, the locomotives of growth are the industries of extraction and intermediate processing of raw materials. At the same time, there is a decline in a number of country's industries which are the most important for investment and consumer demand sectors — machine-building, light industry.

The multidirectional dynamics of the development of different sectors of industry is reflected in the change of output structure (*Fig. 3*). These transformations, in turn, cause the redistribution of gross value added (income) in favor of export-oriented industries of intermediate demand. Practiced profit-taking at the stage of raw materials' extraction and production of semi-finished products lead to depression of final products' production, degradation of production of machinery production means [2]. As the result, the domestic demand for basic and applied science, RW and R&D, TA decreases, the material and technical base of education and health care deteriorates [2], the number of research organizations and its personnel declines (*Tab. 2*). A serious challenge is also the compression of the populated and used space of the country, an indicator of which is the negative dynamics of the population and the volume of economic activity in rural areas [3].

In general, the result of market reforms, carried out in Russia, was the formation of an economic model, the growth of which largely depends on the external environment and the

Figure 3. Industrial structure in Russia in 1991 and 2018, % to total

a) Sectoral structure

b) Territorial structure

Source: calculated according to Rosstat data.

Table 2. Number of organizations that have carried out research and development

Organization	1991	2017	2017 to 1991, %
Research organizations	1831	1577	86.1
Construction organizations	930	273	29.4
Project and survey organizations	559	23	4.1
Pilot plant	15	63	by 4.2 times
Educational institutions of higher education	450	970	by 2.2 times
Organizations of the industry which had research, project and construct divisions	400	380	95,0
Others	379	658	173.6
Total	4564	3944	86.4
Reference: number of personnel engaged in research and development, thousand people	1677.8	707.9	42.2
issued patents for inventions, thousand units	66 (1990)	34	51.5
Source: Rosstat.			

results of export-import activities. The quality of economic growth under the current model cannot be considered satisfactory. It reinforces the lag behind the industrialized countries in scientific, technological, and innovative spheres and in the volume of commodity production of the real economy's high-tech sectors. Dependence on technology import has reached critical levels. According to the Ministry of Industry and Trade of the Russian Federation [4], the import share in several strategic industries exceeded 80% in 2014, in the machine tool industry – more than 90%, in heavy engineering – 80%, light industry – up to 90%, in electronics – up to 90%, in pharmaceutical and medical industry – up to 80%[2].

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[2] In September 2014, RF Government approved "The plan on import substitution in Russian manufacturing", which contained 22 sectoral import substitution plans until 2020. According to experts, most indicators are not achieved. Available at: https://tagilcity.ru/news/economy/06-11-2018/importozameschenie-v-rossii-chto-poluchilos-za-pyat-let

The country faces the problem of choosing new long-term strategy of qualitative economic growth. To change the situation, the government policy on increasing incomes of all economic entities (population, companies, state) at the expense of forming own value-added chains (VAC), producing goods for final production.

The implementation of such policy is impossible without an analysis of existing value-added chains, taking into account its sectoral and territorial specifics: it became the purpose of this study.

2. Theoretical aspects of the research

First, let us define the concepts of gross value-added and value-added chain.

According to the UN guide to National Accounts[3], gross value-added is equal to products' output minus intermediate consumption. It reflects the value of all goods and services that are available for different uses, except for intermediate consumption. The share of gross value-added in output characterizes the part of product's value, which was directly created by its manufacturer. Accordingly, the greater this weight, the less intermediate goods and services are purchased for production, and the weaker economic ties with enterprises-suppliers are. A high proportion of value-added is usually found in industries that are at the beginning of the production chain and are associated with the supply of materials, components and services for later use [5].

In research literature, a value-added chain is understood as a full range of activities that are carried out by enterprises in order to bring a product or service from the development stage to consumer [6]. The growth process of VAC characterizes the geographical fragmentation of production in accordance with the principles of comparative advantage.

The concept of VAC (or rather global VAC) emerged in the 1970s as an attempt to resolve an issue of why some countries develop faster than others. For this, we analyzed the participation of countries in global labor division, assessed its involvement in the process of creating value across all technological chain — from the moment of product's planning to its consumer's implementation.

Currently, the analysis and forecast of territories' involvement in VAC goes on. Cross-sectoral analysis is a recognized analytical tool for the study of inter-territorial cross-sectoral relations. International data bases of cross-country "input − output" tables TiVA[4], WIOD[5], GTAP[6] are created. Considerable experience in the field of theoretical and methodological aspects of the development of inter-territorial cross-sectoral models [7-10] (including inter-regional models [11−15]) has been gained.

3. Methodology of the research

This study is also based on methodology of input-output tables. According to it, in closed economy, if we look from the *point of sale*, for each i sector ($i = 1, …, n$) the value of x_i gross output is totally equal to the volume of its final usage f_i] and the volume of intermediate sales to economic sectors $\sum_j z_{ij}$ (*Fig. 4*).

[3] National Accounts: practical introductory course. New York: UN, 2006. Available at: https://unstats.un.org/unsd/publication/seriesf/seriesf_85r.pdf

Figure 4. Input-output tables of production and distribution

Industries		Intermediate consumption Consumers					Final usage	Total usage
		1	...	*j*	...	*n*		
Manufacturers	*1*	z_{11}	...	z_{1j}	...	z_{1n}	f_1	x_1
	...	...	...	...	...	...	...	...
	i	z_{i1}	...	z_{ij}	...	z_{in}	f_i	x_i
	...	...	...	...	...	...	...	...
	n	z_{n1}	...	z_{nj}	...	z_{nn}	f_n	x_n
GAV		v_1	...	v_j	...	v_n		
Total resources		x_1	...	x_j	...	x_n		

If we denote the costs of i sector's products on production of product unit of j sector through $a_{ij} = z_{ij}/x_j$, then the gross output x_i could be written as

$$x_i = f_i + \sum_j a_{ij} x_j . \qquad (1)$$

The iterative application of formula (1), the gross output of sector i is expressed as a sequence of periods reflecting the use of this sector's products in the production chain:

$$x_i = f_i + \sum_j a_{ij} f_j + \sum_{j,k} a_{ik} a_{kj} f_j + \sum_{j,k,l} a_{il} a_{lk} a_{kj} f_j + \dots . \quad (2)$$

The first part from the right side of the equation (2) $-f_i-$ shows the value of final sales of i sector's products, the second $-$ volume of direct intermediate sales of i sector's products across all j sectors ($j = 1, \dots, n$), used as resources in its first cycle of production processes. Another part points at indirect intermediate sales of i sector across all sectors (including i sector), which are used as resources in its production processes of the first, second, third and following circles [8].

From the point of supply, the volume of used x_j resources by j sector is constituted by the cost of $\sum_i z_{ij}$ intermediate resources, purchased from other industries, and the consumption of fixed capital, wages and profits corresponding to gross value-added of v_j sector. After denoting the share of i sector's products, used in the production of j sector, through $b_{ji} = z_{ij}/x_i$, x_j, it could be written as

$$x_j = v_j + \sum_i x_i b_{ji} . \qquad (3)$$

If we iteratively apply the formula (3), x_j would be expressed as the sequence of periods, reflecting the process of j resources supply with resources:

$$x_j = v_j + \sum_i v_i b_{ji} + \sum_{i,k} v_i b_{ik} b_{kj} + \sum_{i,k,l} v_i b_{ik} b_{kl} b_{lj} + \dots . \quad (4)$$

The first part from the right side of the equation (4) $- v_j -$ characterizes the cost of primary resources, purchased by j sector (labor, administrative services, capital), the second one $-$ the volume of direct interim purchases conducted by j sector in i sectors ($i = 1, \dots, n$), which is required for the first cycle of production process of j sector. Another parts characterize indirect intermediate purchases of products conducted by j sector in all sectors (including j sector itself), used as resources in production process of j sector of the second, third and following cycles.

Table 3. Interpretation of indicator values u and d [18]

	Distance to final consumer (u)	Length of production chain (d)
More	Large share of intermediate consumption (small share of final consumption) in gross output Complex and strong intermediate supply links with technologically related industries	Large share of intermediate products (small share of value-added) in consumed resources Complex and strong intermediate links for the supply of consumable resources with technologically related industries
Less	Small share of intermediate consumption (large share of final consumption) in gross output Simple and weak intermediate connections for the supply of products from technologically related industries	A small fraction of intermediate goods (a large share of value-added) to the consumed resources Simple and weak intermediate links for the supply of consumable resources with technologically related industries

Figure 5. Value-added chain of the sector
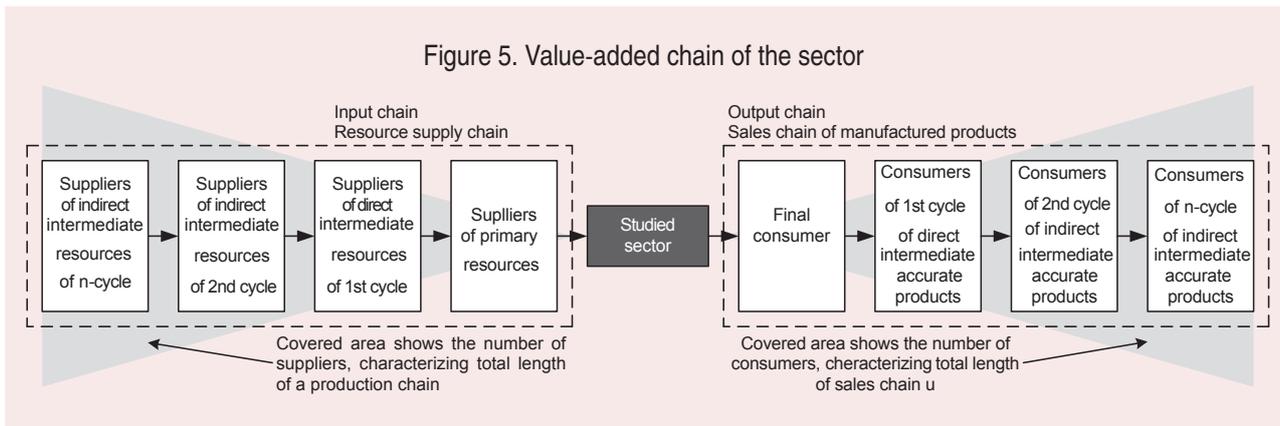
To define average position of sector's output in a sale chain[7] (distance to final consumer), the authors of work [16] suggest multiplying each summand and distance to final consumer plus 1 and normalizing on the sector's gross output

$$u_i = 1 \cdot \frac{f_i}{x_i} + 2 \cdot \frac{\sum_j a_{ij} f_j}{x_i} + 3 \cdot \frac{\sum_{j,k} a_{ik} a_{kj} f_j}{x_i} + 4 \cdot \frac{\sum_{j,k,l} a_{il} a_{lk} a_{kj} f_j}{x_i} + \dots \quad (5)$$

In the situation, when the whole output of i sector is directed at final consumption, u_i indicator takes the value 1. The more the distance, required for the product to pass in order to reach final consumer, is, the higher the u_i value is.

Similarly, to fix the average position of the sector in the supply chain [8] (the length of production chain), the following indicator is used in works [17, 18]:

$$d_j = 1 \cdot \frac{v_j}{x_j} + 2 \cdot \frac{\sum_i v_i b_{ji}}{x_j} + 3 \cdot \frac{\sum_{i,k} v_i b_{ik} b_{kj}}{x_j} + 4 \cdot \frac{\sum_{i,k,l} v_i b_{ik} b_{kl} b_{lj}}{x_j} + \dots \quad (6)$$

d_j takes minimum value in case of low share of intermediate products in resources consumed by j sector (in case, when the production does not require any intermediate products).

Generally, u and d variables characterize fragmentation of production by showing the position of sectors in sales and supply chains (*Tab. 3*; *Fig. 5*).

Acquisition of accurate u and d values is hindered by never-ending summation of parts in equations (5) and (6). Therefore, in practice, alternative expressions are used, based on relations known in the cross-sectoral balance[9]. It is shown in work [16] that alternative way of calculation provides same results.

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[7] Output supply chain.
[8] Input demand chain.

[9] We mean the reverse matrix of Leont'ev I + A + A² + ... = (I − A)⁻¹ and reverse matrix of Gosh I + B + B² + ... = (I − B)⁻¹.

Distance to final consumer is defined as

$$U_i = 1 + \sum_j a_{ij} U_j .$$ (7)

or in matrix form:

$$U = [I - A]^{-1} 1 ,$$ (8)

where I − single matrix; A − matrix with a_{ij} typical element; 1 − single vector.

The indicator, characterizing the length of a production chain, can be written as

$$D_j = 1 + \sum_i b_{ji} D_i ,$$ (9)

or in matrix form:

$$D = 1 \cdot [I - B]^{-1} ,$$ (10)

where B − matrix with b_{ji} typical element.

In case of an open economy, U and D indicators are calculated similarly according to formulas (8) and (10), but with taking into account goods and services' export and import.

Weighting of U and D indicators while aggregating is conducted, respectively, on the basis of sectors' value-added and cost of goods, used for final consumption.

If we examine the economy of regions as a set of sectors, the use of these indicators, taking into account the specific weight of corresponding sectors in the economy, will allow characterizing the position of regions in value-added chains. We propose calculations of aggregated indicators U and D in regional economy (U_R and D_R respectively), defined as the sum of products of U_i and D_j sectoral indicators and specific weights of sectors in gross output (w):

$$U_R = \sum_i U_i w_i ,$$ (11)

$$D_R = \sum_j D_j w_j ,$$ (12)

It should be noted that the assessment of fragmentation of production by similar methods was carried out in the economies of the United States [16, 19], China [20, 21], Poland [22], Asia [23] and in the global context [18, 24]. For Russia, only sales chains were investigated [25, 26], supply chains were investigated for the first time.

3. Source of the data

To calculate indicators characterizing the fragmentation of production in the Russian economy, we used data from basic "costs-output" tables of Rosstat for 2011 for 125 sectors, as well as UISIS data on an amount of shipped goods of own production, performed works and services for 2017 within 263 sectors (these sectors were aggregated according to 125-branch nomenclature of "costs-output" tables) for entities of the Russian Federation. Given the fact that regional input-output tables are not developed by official statistics, to calculate regional indicators, we used the assumption of similarity of average technological processes in similar sectors across the country and in selected regions (country sectoral values of indicators U and D were taken).

4. Fragmentation of production in Russian economy

The weighted average number of production stages in the Russian economy turned out to be less than 2, i.e. production resources undergo less than two repartitions on average before reaching a final consumer[10]. It could be explained by a growing role of services in Russian economy (in 2018, it formed more than 60% of gross value-added), which require less production stages and are situated closer to final demand that production of commodity-producing industries.

[10] Of interest is the fact that average number of production stages in USA also does not exceed 2 (according to 2002 data). Besides, production fragmentation, in the last 50 years, has had a trend of declining there [17], which explains a switch in D. Trump's industrial policy turn to reindustrialization and transfer of enterprises into the United States.

4.1. Sectoral specifics of Russian VAC

The most fragmented sectors of Russian economy are industrial sectors[11]. Average length of production chain (D) in processing productions is 2.57, in energetics − 2.56 (*Fig. 6*). In its production consumption structure, intermediate industrial products (raw materials, electricity, semi-finished products) prevail (occupying more than 70%), which cases the necessity to provide many operations on its procession (*Tab. 4*).

Transport sector has, averagely, 2.15 stages of production due to active usage of engineering products (which passes a large number of repartitions on its way to manufacture) and road maintenance services. Similar length of production chain − 2.10 − is in the construction, which is

Figure 6. The length of the production chain (D) in 7 enlarged sectors of the Russian economy
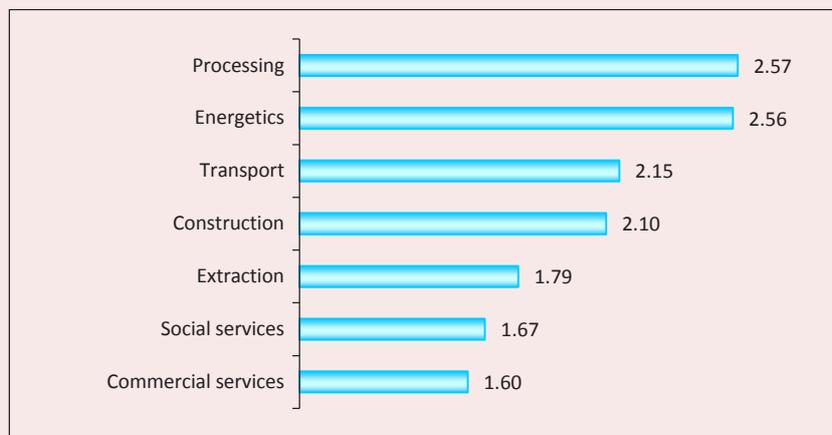
Source: calculated according to Rosstat data.

Table 4. Structure of production consumption of 7 enlarged branches of the Russian economy, % to total

Sectors-producers	Sectors-consumers						
	Extraction	Processing	Energetics	Construction	Transport	Commercial services	Social services
Extraction	25.6	23.6	10.7	2.6	1.1	0.9	2.0
Processing	26.4	45.1	7.8	58.3	23.7	15.7	23.7
Energetics	8.2	5.2	52.4	1.8	7.6	4.7	10.4
Construction	2.8	1.1	1.9	7.9	4.9	3.4	16.2
Transport	13.3	6.8	1.8	5.8	30.4	21.4	10.3
Commercial services	22.7	17.5	24.8	22.5	30.7	49.9	28.2
Social services	0.8	0.6	0.6	1.2	1.5	4.1	9.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Reference: industry	60.3	73.9	71.0	62.6	32.4	21.3	36.1
Source: calculated according to Rosstat data.							

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[11] The study identified 7 enlarged sectors of the economy: extraction (sections A,B,C according to OKVED), processing (D), energetics (E), construction (F), transport (I), commercial (G, H, J, K) and social (L, M, N, O) services.

presumed to be one of the most multiplicative sectors of the economy (it has the highest share of consumption of processing industry's products – more than 58% in total amount of consumed resources; it is very close to final consumer).

The most fragmented sectors are the spheres of commercial and social services, as well as extractive sectors. The short length of production chains in it is largely caused by weak interaction with technologically related sectors on the line of consumed resources supply and the intensive usage of direct labor costs (this is especially valid for social services –governance, education and health; *Tab. 5*).

The ranking of sectors according to distance to a final user (length of a supply chain) is given in *Figure 7*. Social services ($U = 1.09$) and construction (1.42) can be attributed to sectors, output in which is almost completely spent on final consumption.

A pronounced distance from the final consumption is typical for energetics (3.02), transport (2.74), and extraction (2.66). Its products are used as resources and intermediate goods in technologically related industries. Processing (2.09) and commercial services (1.92) are located roughly in the middle of the VAC.

Table 5. Structure of gross value-added of 7 enlarged branches of the Russian economy, % to total

Costs	Extraction	Processing	Energetics	Construction	Transport	Commercial services	Social services
Salary	16.2	43.9	46.4	37.3	46.9	27.7	77.8
Other production taxes	0.1	1.4	3.3	0.5	1.8	1.0	1.1
Consumption of fixed capital	6.2	7.5	8.8	1.8	6.8	14.1	15.9
Net profit	77.5	47.2	41.6	60.4	44.5	57.2	5.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Source: calculated according to Rosstat data.							

Figure 7. Distance to the final consumer (*U*) in 7 enlarged branches of the Russian economy
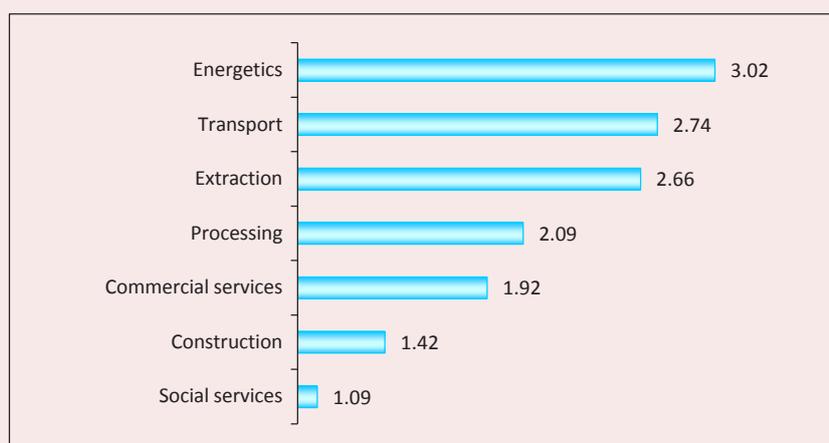
Source: calculated according to Rosstat data.

Since enlarged branches of the economy are considered very heterogeneous in its production structures, we will enlarge the scale and consider *U* and *D* in a 32-branch breakdown.

The farthest from final consumers – approximately three stages away according to the VAC – are mining sectors ($U \approx 4$; *Tab. 6*). Closer ($U \approx 3$) are several intermediate sectors of processing industry oil refining, chemistry, metallurgy, woodworking), energetics, financial activity, transport, and communications. Real estate operations, polygraphy, mechanical engineering, agriculture, and fishing are one stage away from final consumers ($U \approx 2$). Other sectors send almost all its output directly to households and government officials ($U \approx 1$), providing them with food, clothing, nutrition, accommodation, health care, and education.

Variation of values of *D* indicator, characterizing the length of production chains, is much shorter in Russian economy. In two VAC stages away from suppliers of primary resources (employees, public authorities, investors; $D \approx 3$), 12 sectors of economy are situated, in one stage ($D \approx 2$) – 18 more sectors. Two sectors cooperate with other economic sectors quite poorly, purchasing most of necessary resources (labor, administrative services, and capital) directly from primary resource suppliers ($D \approx 1$).

Table 6. Averaged U and D values for 32 branches of the Russian economy

U, D	Number	Sector
$U \approx 4$	2	Extraction of fuel and energy minerals (3.65); extraction of minerals, except fuel and energy (3.51)
$U \approx 3$	12	Production and distribution of electricity, gas and water (3.17); production of coke, petroleum products and nuclear materials (3.10); metallurgical production (2.91); forestry (2.87); pulp and paper production (2.75); transport and communications (2.74); wood processing and production of wood products (2.71); chemical production (2.63); production of other non-metallic mineral products (2.63); financial activities (2.58); production of rubber and plastic products (2.54); production of finished metal products (2.53)
$U \approx 2$	10	Publishing and printing activities (2.38); real estate transactions, rent and provision of services (2.06); production of electrical, electronic, and optical equipment (2.00); other production (1.95); fishing, fish farming (1.95); production of machinery and equipment (1.93); agriculture (1.90); wholesale and retail trade (1.85); production of vehicles and equipment (1.63); provision of other public, social, and personal services (1.55)
$U \approx 1$	8	Textile and clothing production (1.49); construction (1.42); food, including beverages, and tobacco production (1.34); hotels and restaurants (1.32); public administration and military security, compulsory social security (1.13); leather, leather goods and footwear production (1.12); education (1.08); health and social services (1.05)
$D \approx 3$	12	Manufacture of rubber and plastic products (2.89); manufacture of vehicles and equipment (2.80); other production (2.72); manufacture of finished metal products (2.71); manufacture of food products, including beverages, and tobacco (2.64); metallurgical production (2.63); manufacture of other non-metallic mineral products (2.57); pulp and paper production (2.55); electricity, gas and water production and distribution (2.54); leather, leather goods and footwear production (2.53); machinery and equipment production (2.53); chemical production (2.51)
$D \approx 2$	18	Production of electrical, electronic, and optical equipment (2.47); fishing, fish farming (2.44); wood processing and production of wood products (2.43); textile and clothing production (2.41); publishing and printing activities (2.40); production of coke, petroleum products, and nuclear materials (2.35); construction (2.11); transport and communications (2.06); hotels and restaurants (2.03); forestry (2.02); agriculture (2.01); mining, except fuel and energy (1.91); provision of other municipal, social and personal services (1.82); health and social services (1.72); public administration and military security; compulsory social security (1.69); wholesale and retail trade; repair of motor vehicles, motorcycles, household goods and personal items (1.67); extraction of fuel and energy minerals (1.63); financial activities (1.51)
$D \approx 1$	2	Education (1.49); real estate transactions, rent, and services (1.45)
Source: calculated according to Rosstat data.		

In *Table 7*, there is a structure of production costs of economic sectors, characterizing relation of consumption of primary and intermediate resources and allowing understanding reasons of length of particular production process. Thus, high labor intensity (the weight of labor costs) determines the small length of the production chain in education, health, and public administration, a significant capital intensity (the weight of consumption of fixed capital) — in mining and real estate operations. Sectors of processing industry (which is logical)

Table 7. Structure of production costs of Russian economic sectors, % to total

Sector	Primary resources			Intermediate sectoral resources	D
	Salary	Other production taxes	Consumption of fixed capital		
Production of coke, petroleum products, and nuclear materials	3.1	0.4	1.8	94.7	2.353
Metallurgical production	10.0	0.6	2.2	87.2	2.626
Production of food products, including beverages, and tobacco	11.0	0.4	1.7	86.9	2.638
Chemical production	12.0	0.6	2.5	84.9	2.513
Manufacture of rubber and plastic products	13.7	0.4	1.6	84.3	2.885
Other productions	14.6	0.3	3.3	81.9	2.718
Pulp and paper production	14.7	0.7	2.8	81.7	2.551
Agriculture	18.2	-3.0	4.2	80.6	2.005
Production and distribution of electricity, gas, and water	15.7	1.1	3.0	80.2	2.538
Production of vehicles and equipment	18.6	0.1	2.7	78.6	2.801
Production of other non-metallic mineral products	18.7	0.6	2.5	78.2	2.570
Wood processing and production of wood products	19.4	0.6	2.6	77.4	2.426
Production of leather, leather products, and footwear	22.2	0.2	1.1	76.6	2.532
Fishing, fish farming	20.1	0.6	3.4	75.9	2.442
Textile and clothing production	22.8	0.2	1.3	75.8	2.412
Production of finished metal products	20.1	0.4	3.9	75.6	2.714
Publishing and printing activities	25.6	0.4	1.5	72.4	2.401
Construction	26.9	0.4	1.3	71.5	2.105
Production of machinery and equipment	26.2	0.4	2.3	71.2	2.527
Extraction of fuel and energy minerals	17.4	1.9	10.0	70.7	1.631
Production of electrical, electronic, and optical equipment	25.7	0.4	4.4	69.4	2.472
Hotels and restaurants	27.8	0.5	3.0	68.7	2.028
Transport and communications	27.8	1.1	4.0	67.1	2.059
Forestry	31.5	0.1	2.7	65.6	2.018
Mining, except for fuel and energy	30.0	1.2	5.1	63.7	1.908
Wholesale and retail trade	32.3	0.6	9.4	57.7	1.668
Provision of other public, social, and personal services	41.9	0.8	6.1	51.3	1.823
Financial activity	45.4	4.9	4.6	45.1	1.510
Real estate transactions, rentals, and services	27.1	0.8	28.9	43.2	1.451
Health and social services	58.4	0.7	1.9	39.0	1.719
Public administration and military security; compulsory social security	43.4	0.3	17.5	38.8	1.693
Education	67.4	1.7	3.0	27.9	1.490
Source: calculated according to Rosstat data.					

have longer production chains, since it is material-intensive and purchases the bulk of the resources they need from other sectors of the economy. In general, the results of correlation analysis show that higher the material intensity and the lower the labor and capital intensity of production are, the longer the production chain of a particular industry is (*Tab. 8*).

Concluding review of the industry specifics of Russian VAC, we will show, without describing detailed results, highest and lowest values of *D* and *U* indicators of economic sectors in he most available scale (in 125-sectoral breakdown; *Tab. 9)*.

The longest production chains, usually with little value-added at each stage, have different sub-sectors of engineering, the shortest — services in the field of finance, real estate, and education. There is a strong negative correlation between the degree of fragmentation of production and the level of value added created at different stages of production (*Fig. 8*).

According to the index, which characterizes the number of stages between production and final demand, the highest values are shown in sectors producing raw materials: coal, iron ore, coke, gas; the least — light industry, public organizations.

Table 8. Correlation of industry characteristics with *D* and *U* indicators

| Characteristics of sectors	D	U
Material consumption (ratio of intermediate consumption to output)	0.969*	0.005
Labor intensity (the ratio of wages to output)	-0.356*	-0.216*
Capital intensity (ratio of consumption of fixed capital to output)	-0.276*	0.012
Profitability (ratio of net profit to output)	-0.640*	0.142
Note: marked * coefficients of correlation are important when p<0.05. Source: calculated according to Rosstat data.		

Table 9. Products with highest and lowest *U* and *D* values

| Rank	Length of production chain			Distance to final consumer	
	Product	D	GVA/O*	*Product*	U
1	Motor vehicles, trailers, and semi-trailers	3.191	0.14	Coal and brown coal (lignite); peat	4.432
2	Equipment for agriculture and forestry	3.117	0.15	Iron ores	4.427
3	Other products of primary processing of ferrous metals	3.115	0.16	Production of coke ovens	4.376
4	Insulated wires and cables	3.011	0.10	Natural gas	4.156
5	Pipes and pipe elements	3.001	0.20	Secondary raw materials	4.104
…	…	…	…	…	…
121	Services in the field of education	1.510	0.73	Services in the field of health	1.049
122	Support services in the field of financial intermediation	1.505	0.69	Suitcases, handbags and similar goods; saddlebags and harness	1.039
123	Financial intermediation services	1.454	0.72	Tobacco products	1.025
124	Services related to real estate	1.303	0.84	Leather clothing	1.006
125	Rental services for cars and equipment, household products and personal items	1.145	0.92	Services of public organizations, not included in other groupings	1.000
GVA/O – relation of gross value-added to output. Source: calculated according to Rosstat data.					

Figure 8. Dependence between the length of the production chain (*D*) and the share
of value-added in the output of 125 sectors of the Russian economy
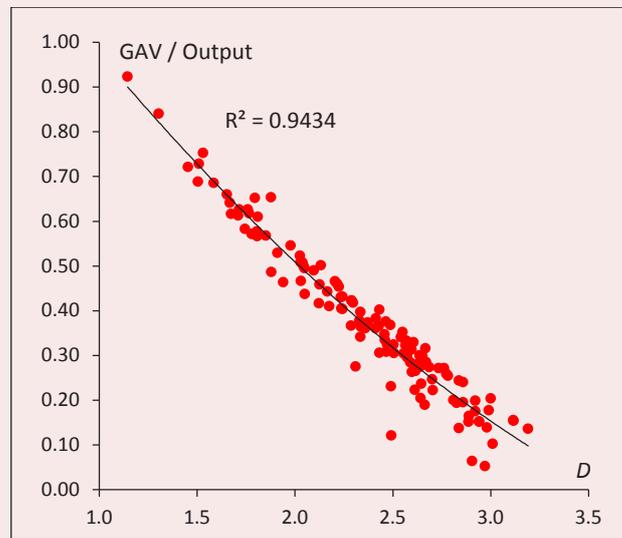
Source: calculated according to Rosstat data.

Figure 9. Scatter diagram of the values of *U* and *D* indicators of 125 branches
of the Russian economy
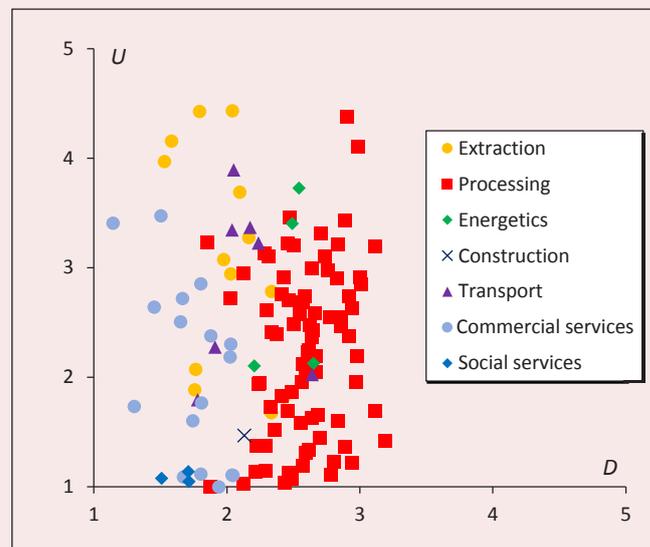
Source: calculated according to Rosstat data.

The graphical distribution of sectors, depending on the length of its production and sales chains, is shown in *Figure 9.*

Statistical connection between *D* and *U* values is not noticeable (correlation coefficient is -0.005).

Table 10. Distribution of Russian regions by size of U_R и D_R indicators

| Length of production chain (D_R)		Distance to final consumer (U_R)			
		$U_R \approx 2$	$U_R \approx 3$		$U_R \approx 4$
		$U_R \in [1.6; 2.5)$	$U_R \in [2.5; 3.0)$	$U_R \in [3.0; 3.5)$	$U_R \in [3.5; 3.7]$
$D_R \approx 2$	$D_R \in [1.7; 2.0)$	–	Kalmykia, Karelia, and Dagestan republics	Khanty-Mansiysk AO, Sakhalin and Astrakhan oblasts, Sakha (Yakutia) republic	Nenets AO, Yamalo-Nenets AO
	$D_R \in [2.0; 2.3)$	Buryatia Rep., Primorsky Krai, Krasnodar Krai, Korsk Obl, Chechen Rep, Novosibirsk Obl., Bryansk Obl., Saint Petersburg, Stavropol Krai, Crimea Rep., Sevastopol, Altai Rep., Penza Obl., Moscow Obl., Kamchatka Krai, Oryol Obl., Adygea Rep., Kabardino-Balkar Rep., Tambov Obl., North Ossetia – Alania Rep., Ingushetia Rep.	Tyva Rep., Irkutsk Obl., Khakassia Rep, Tomsk Obl., Perm Krai, Tyumen Obl. (without AO), Krasnoyarsk Krai, Jewish AO., Tatarstan Rep., Omsk Obl., Volgograd Obl., Amursk Obl., Murmansk Obl., Bashkortostan Rep., Khabarovsk Krai, Moscow, Udmurt Rep.	Chukotka AO, Komi Rep., Orenburg Rep., Magadan Obl., Zabaykalsky Krai	Kemerovo Obl.
	$D_R \in [2.3; 2.5)$	Samara Obl., Belgorod Obl., Leningrad Obl., Tula Obl., Altai Krai, Arkhangelsk Obl. (without AO), Nizhny Novgorod Obl., Tver Oblast., Smolensk Obl., Rostov Obl., Novgorod Obl., Kirov Obl., Ryazan Obl., Yaroslavl Obl., Voronezh Obl., Kostroma Obl., Kurgan Obl., Mari El Republic, Chuvash Rep., Karachay-Cherkess Rep., Ivanovo Obl., Vladimir Obl., Mordovia Rep., Pskov Obl., Ulyanovsk Obl.	Sverdlovsk Obl., Saratov Obl.	–	–
$D_R \approx 3$	$D_R \in [2.5; 2.7]$	Kaluga Obl., Kaliningrad Obl.	Lipetsk Obl., Vologda Obl., Chelyabinsk Obl.	–	–
Source: calculated according to Rosstat data.					

4.2. Regional specifics of Russian VAC

The scope of *D* and *U* sectoral values and the diversity of industrial specialization in Russian regions has led to a significant territorial differentiation of VAC. It is logical that position of a certain region in production and sales chains is defined by the nomenclature of its products. Thus, the furthest from primary resources suppliers ($D_R \approx 3$) are the regions, economic structure of which includes resource-intensive production of the automotive (the Kaluga and Kaliningrad oblasts) and metallurgical (the Lipetsk, Vologda, and Chelyabinsk oblasts) orientation (*Tab. 10*). The most Russian regions (80 out of 85) have similar lengths of production chains ($D_R \approx 2$) and they are situated, averagely, one stage away from primary resources suppliers. Among them, the shortest production chains — $D_R \in [1,7; 2,0)$ — belong to regions with weakly diversified economy, specializing in the production of oil, gas, and iron ore (Khanty-Mansi, Nenets, and Yamalo-Nenets autonomous okrugs, Sakha (Yakutia) and Karelia republics, the Sakhalin and Astrakhan oblasts), wholesale (republics of Kalmykia and Dagestan).

Figure 10. Aggregated D_R indicator on the economy of Russian regions

1.686 ▭ 2.630
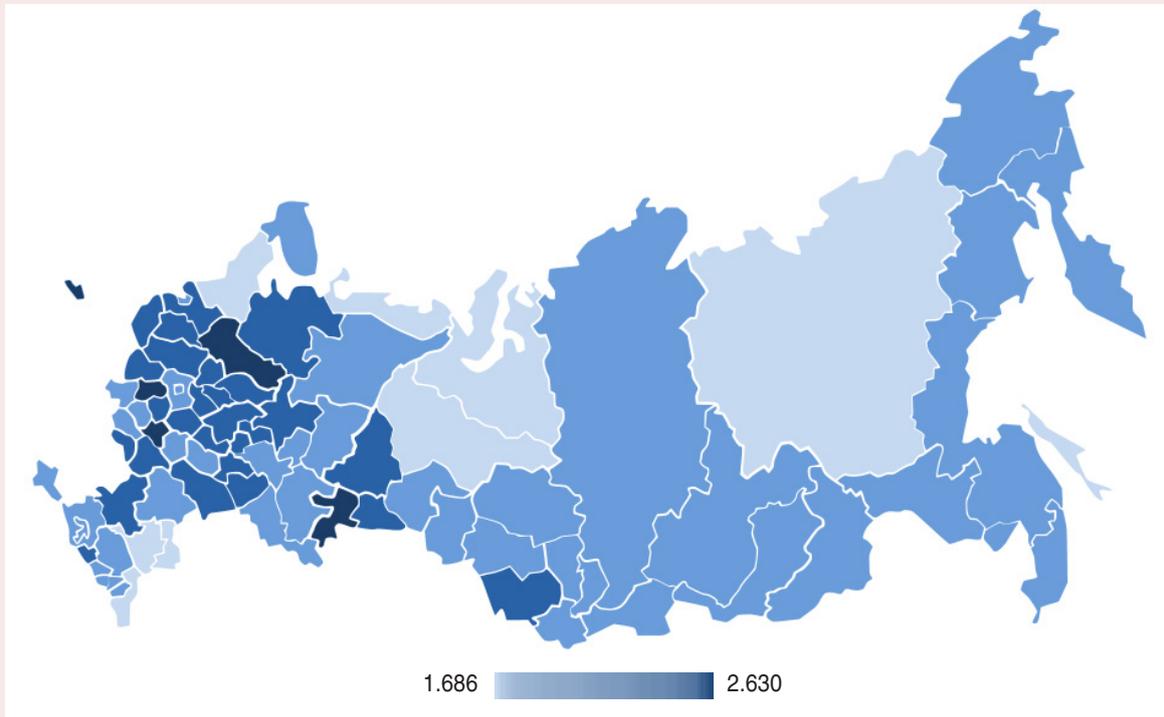
Source: calculated according to Rosstat data.

Figure 11. Aggregated U_R indicator on the economy of Russian regions


1.620 ▭ 3.697
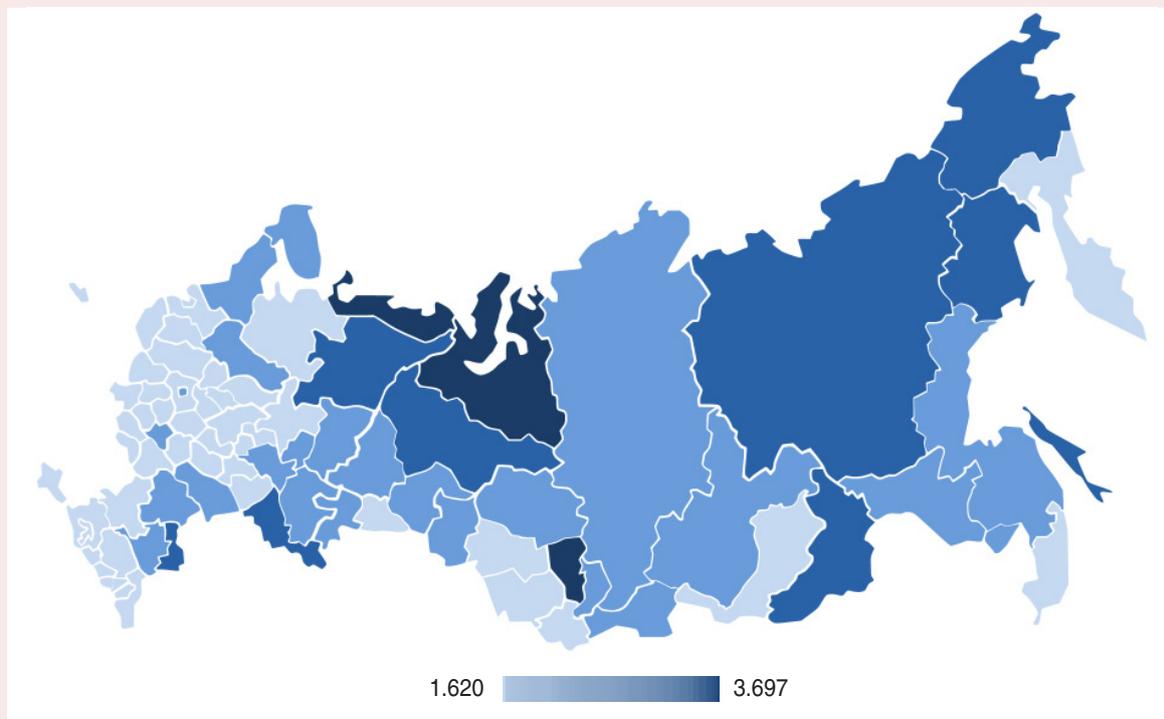
Source: calculated according to Rosstat data.

The longest sale chains − $U_R \in [3,0; 3,7]$ − are typical for resource-producing regions (Nenets, Yamalo-Nenets, Khanty-Mansiysk, and Chukotka AO, Sakha (Yakutia) and Komi republics, Kemerovo, Sakhalin, Astrakhan, Orenburg, and Magadan oblasts, Zabaykalsky Krai), products of which, before reaching final Russian consumer, go, averagely, through 2−2.5 repartitions. Values of indicator of U_R regions, specializing in processing industry[11] (Omsk, Kaluga, Vladimir, Lipetsk, Tula, Nizhny Novgorod, Novgorod, Sverdlovsk, Chelyabinsk and Vologda oblasts, Krasnoyarsk Krai), are within 2.1−3 range. Lowest U_R values are noticed in regions, where industry is poorly developed, and the economy is dominated by agriculture, food production, trade, and the health, education, and public administration sectors (Ingushetia, Tyva, North Ossetia − Alania, Altai, Kalmykia, Adygea, Dagestan, Crimea, Chechen, Karachay-Cherkess, Kabardino-Balkar republics; Kamchatka and Stavropol krais; Sevastopol).

Geographical redistribution of regional D_R and U_R indicators across the country is given in *Figures 10 and 11*. Regional enterprises in European part of Russia, averagely, take higher position in production chains. Because of their proximity to the places of population accumulation, semi-finished products from all over the country (from the regions of Siberia and the Far East through the Urals) are sent there for the production of final products.

There is a strong negative connection between the place of region in production and sale chains (correlation coefficient between D_R and U_R is equal to -0,580; *Fig. 12*). On average, the region, which is close to final consumers in supply chains, end up further away from primary resource suppliers in production chains. It means that in Russian VAC, on regional level, there is a clear territorial labor division, when some regions are specialized in extraction of various minerals, and others − in its primary processing and production of final goods from semi-finished products.

Figure 12. The scatter diagram of values of aggregated U_R и D_R indicators of Russian regions in 2017

$R^2 = 0.3362$
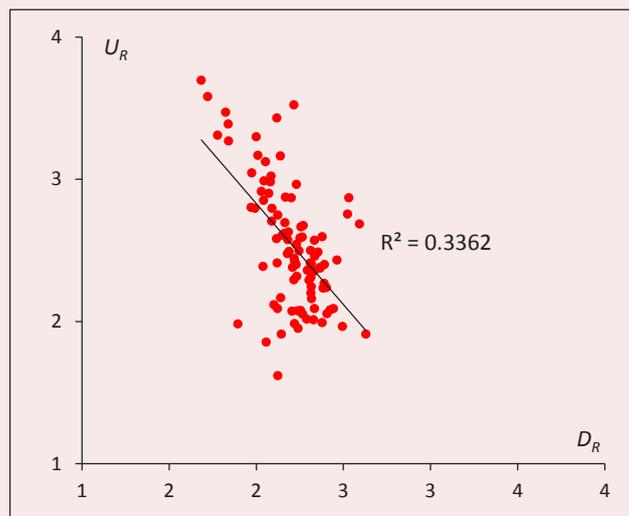
Source: calculated according to Rosstat data.

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[11] Share of gross value-added, created by processing productions, exceeds 30% of GRP.

Table 11. Correlation of regions' characteristics of socio-economic development with DR and UR indicators

Characteristics	D_R	U_R
Average per capita GRP	-0.544*	0.574*
The capital intensity of GRP	-0.355*	0.229*
The weight of unprofitable organizations	-0.226*	0.203*
Average per capita investment in fixed assets	-0.519*	0.497*
Per capita export volume	-0.318*	0.439*
Average per capita imports	-0.020	0.078
Average per capita number of small businesses	0.187	0.004
Average per capita income of consolidated budget	-0.453*	0.523*
Average per capita number of government employees	-0.326*	0.380*
Average per capita expenditure on research and development	-0.017	0.198
Costs of technological innovation	-0.252*	0.353*
Per capita population income	-0.452*	0.522*
Average monthly accrued wages of employees	-0.514*	0.622*
Per capita actual household consumption	-0.387*	0.437*
Average per capita number of passenger cars	0.240*	-0.022
Average per capita area of residential premises	0.483*	-0.153
Crude birth rate	-0.539*	0.250*
Overall mortality rate	0.627*	-0.241*
Migration growth rate	0.151	-0.333*
Population morbidity	-0.158	0.427*
Unemployment rate	-0.210*	-0.155
Crime rate	-0.158	0.475*

Note: correlation coefficients marked with * are important when $p < 0.05$.
Source: calculated according to Rosstat data.

At the same time it is remarkable that the position of a region in VAC heavily defines the level of its socio-economic development. Heavy correlation of D_R and U_R indicators is noticeable with average per capita GRP, investments in fixed capital, population's incomes and consolidated budget (*Tab. 11*).

Values of all these indicators are averagely higher in regions which are located at the beginning of production chain and at the end of sale chain. At the same time, the middle link is the most "deprived" regions with developed processing industry. It might be observed that the state, as a whole, poorly copes with the task of redistributing income on VAC. This conclusion is confirmed by other researchers [27].

5. Conclusion

Conducted research allowed quantitative assessment of the degree of production fragmentation in Russian economy on the basis of analysis of production and sale chains of sectors and regional economies (as set of sectors). Its results allow drawing the following conclusions.

1. Position of a sector in production or sale chain is usually different, because the structure of products' output is not identical to the structure of purchasing intermediate materials. For example, processing productions are at the end of a production chain and in the middle of a sale chain. At the same time, there is no correlation between lengths of production and sale chains on disaggregated sectoral level in

Russia (unlike, for example, in the United States [19]). A possible explanation might be a significant disparity in export-import operations, characterized by the export of raw materials and the import of high-value products (in a closed economy, the length of production and sale chains are equal).

2. The length of production chain of a specific sector is defined by the ratio of primary and intermediate resources consumption. Material-intensive productions include more production stages, labor- and capital-intensive — respectively less. The share of gross value-added decreases as the production chain lengthens. The more fragmented production is, the fewer value-added is created at each of its stage.

3. Position of sectors in sale chain correctly reflects ranking, when one production serves as primary supplier of services for another. For example, producers of books ($U = 1.935$) purchase supplies from paper manufacturers ($U = 2.245$), which, in turn, use products of pulp producers ($U = 3.211$). This feature is extremely valuable for practical use in the design of VAC.

4. Russian economy has significant differentiation of regions' position in VAC and clear territorial labor division from USSR times. There is dependence between a place of region in production and sale chains. A region, which averagely stands at the end of sale chains (i.e. specializes in final production output),

turns out to be further away from suppliers of fixed resources in production chain (i.e. uses more semi-products)

5. Position of the region in VAC affects the results of its socio-economic development. Comparison of D_R and U_R values with key indicators of regional development allowed pointing out its interconnections with GRP, investments in fixed capital, export, incomes of consolidated budget, population consumption (and even with fertility, mortality, morbidity, and crime)

The novelty of the research, justifying its contribution to the development of science, is the adaptation of cross-sectoral approach to assessment of production fragmentation to regional level and identification of modern regularities in the functioning of Russian VAC on the basis of its approbation on the materials of RF entities. Materials of the article might be useful for decision-makers who justify economic policy on the regional level. Prospects of following studies are connected with methodological and analytical provision of using proposed instruments in state economy's regulation. It is important to take into account the sectoral specialization of regions in existing national VAC, as well as to develop public policy directions of its extension on the basis of foresight research of industrialized countries' production and sale chains.

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The Potential for Integration of the Transport Complex of the East of Russia into the International Market of Transport Services

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Abstract. The eastern regions of Russia are the convenient zone in which Russia cooperates with the actively developing Asian region. The key states of North-East Asia such as China, Japan, and the Republic of Korea are the largest participants in world trade at the present stage. The servicing of large-scale commodity flows with the European Union and the U.S. is provided by the market of transport services, by means of which the most effective schemes of delivery are built. Under these conditions, the transport system of the East of Russia has objective prerequisites for integration into the international transport system. The goal of our present study is to assess the potential of integration of the transport system of the Far East in the market of transport services in North-East Asia. At the same time, we assess integration opportunities with the help of dividing the territory of the East of Russia into districts based on the results of cluster analysis. Considering the achievement of the research goal, this approach is a new one. The need for division is due to the fact that the Far East is quite a large region, extremely heterogeneous in its internal composition, economic-geographical and socio-economic characteristics. Constituent entities of the Russian Federation as part of the Far Eastern Federal District have, among other things, different integration potential and level of development of the transport system. In the course of cluster analysis we use indicators of transport network development and the scale of foreign economic activity as the criteria for division. As a result of our calculations, we divide the Far East into five regions that differ in the potential of integration interaction of the transport system with the market of transport services in North-East Asia. The paper presents specific features of the selected areas, characteristics of

transport systems and prospects for participation in the international transport market. In the future, it is possible to conduct a study taking into account the projects for development of the transport system of the Far East, which adjust the prospects for integration interactions.

Key words: integration, transport system, Russian Far East, cluster analysis, North-East Asia, transport services market.

Introduction

The boundary position of the Eastern regions of Russia creates preconditions for interaction with large-scale economically developed countries in the Asian region (China, Japan, Republic of Korea). These countries to date have developed trade interaction with the global economy and extensive transport links serving the trade. Thus, by the end of 2018, the total merchandise exports of PRC, Japan and Republic of Korea have amounted to 3.8 trillion US dollars, imports amounted to 3.4 trillion US dollars[1]. While the most important trade partners of the leading Asian countries are the United States and the European Union.

The Far East of Russia geographically belongs to the North East Asia (NEA), having the preconditions of integration into the ongoing processes. Under these conditions the transportation system in Eastern Russia in collaboration with the international transport system could participate in the service trade flows of the countries of the North East Asia. The active involvement of the Far East transport system into the international transport market can be considered as a potential driver of economic development in the Eastern regions corresponding to the actual directions of Russia's state policy at the present stage. To date, however, the extent of such participation is negligible.

The purpose of this research is to assess the potential for integration of the transport system of the Far East in the transport market of the North East Asia selecting the areas on the basis

of cluster approach. The scientific novelty of the conducted research the results of which are reflected in this article is the analysis of the integration potential of the Russian transport system on the testing ground of the North East Asia, as well as the possibility of increasing the degree of diversity, respectively, sustainability and efficiency of the international transport integration systems currently designed in the North East Asia. The use of cluster analysis is an element of the novelty allowing to expand the range of instrumental methods in achieving this goal.

The work on fundamentals of economic integration do not directly affect the problems of transport maintenance [1; 2; 3]. The presence of a transport infrastructure is assumed as one of the elements supporting the integration processes when considering different forms and levels of integration.

The close study of transport systems integration processes in modern literature is associated first and foremost with the construction of effective interactions in United Europe. In this context, we discuss the issues of interlinking between the transport systems of individual countries in the framework of the common transport system of the European Union (EU), in particular the effectof individual types of transport on the environment and the identification of the most extensive issuers of pollutants in the transport sector. The negative impact of road transport and the relevance of the application of measures to reduce carbon emissions in the medium term (the period of 2020-2030) are

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[1] International Trade Center. Available at: http://www.trademap.org/ (accessed 04.10.2019).

emphasized. According to the estimates the delay of the processes of decarbonization of the transport system will lead to an increase in the cost of this process in the framework of the EU in the period after 2030 [4; 5]. The dynamics of transport emissions in the European countries, the largest emitters of hydrocarbons, including the calculation in the context of cross-sectoral linkages is estimated [6].

Border crossing is one of the most important issues when considering the integration of transport systems. This problem is also most evident on the example of the EU. In the current literature the spatial characteristics of network development and other determinants of transport mobility in transboundary movements of the United Europe, including transport corridors, are being discussed. The availability of adequate transport links is one of the key factors contributing to the creation of a common economic space. We propose to evaluate the boundaries' permeability using the ratio of the demand and supply for cross-border movements along the routes of the used modes of transport, and to consider the integration of transport systems in transport corridors as the process of achieving sustainability from the point of view of not only the environment but also the socio-economic development [7; 8; 9].

Another research direction is the field of transport systems integration refers to the inclusion of the former Soviet republics into the global transport space. In the publications of the comparative advantages of transit routes of Central Asian countries and the Eurasian Union, estimated the magnitude and direction of transport links and promising options for the transport projects of the Eurasian economic Union [10; 11; 12].

In the scientific papers concerning integration in the NEA including those from the point of view of transportation systems the possible effects of creating different conditions of operation, the application of measures of state regulation, the reduction of ecological load on the environment are discussed [13; 14; 15]. Thus, for air transport relevant in the absence of a single terrestrial networks between the countries in the region, the competitive strategies of key airports, network vulnerability settings, the consequences of the introduction of "open skies" by the leading northeast Asian countries are examined [16; 17]. The positive effects for both the users of air transport services, and the airlines in the case of air transport market liberalization are shown. The policy of space distribution for domestic and international flows in airports is revealed as an important complementary measure. The operational stability of the airport network in NEA and the units that are mostly exposed to risk are determined [18; 19].

The research on the problems of development of maritime transportation, serving trade flows within the northeast Asia region, and economic relations of the countries of the region with the world are devoted to the analysis of development trends of the key states' ports, the strategies of cooperation in the field of maritime transport. Thus, when comparing the competitive advantages of container sea ports of the three leading northeast Asian countries – China, Japan, Republic of Korea – we have identified (20 criteria were selected for evaluation and experts' survey was conducted) the leading market position of Busan port [20]. The transition from competition between ports to cooperation in individual countries is noted. It is shown that in Japan, the expansion of sea ports' cooperation allows using the existing capacity more efficiently, and public and private financing of targeted investments in new assets [21]. The strategy of cooperation of sea ports in China is being considered, where encouraging methods and the possible implementation schemes are elaborated by the government at national and provincial levels [22; 23].

Description of the research methodology and substantiation of its choice

The question of assessing the potential for integration of the transport system in the Russia's Eastern regions into the transport market of the North East Asia is debatable, its solution may not be simple and straightforward. First, the study object seems to be difficult – the transport system of the Far East including different types of transport operating in the territorial systems differ in their internal characteristics, interaction and communication between them and other agents of the transport services market and the economy as a whole. Secondly, the study is complicated by the instability of the situation arising in the process of transformation of individual elements of the transport complex of Russia, and under the influence of fluctuations of economic systems (at the national and international levels).

The first of the above-mentioned cir-cumstances leads to the consideration of the potential for integration of the Far East transport system without taking into account inner differentiation of such a large object, seems to be unproductive. A more efficient approach is based on the study of key cha-racteristics, dynamics and prospects of transport in the region in order to separate homogeneous segments. In this case there is the possibility of determining the areas historically associated by the specialization of the transport system, economic interactions, the level of foreign economic relations and possible areas of further integration into the transport market of the North East Asia.

Segmentation of the Far East can be conducted with different purposes [24; 25; 26; 27; 28; 29]. Despite the fact that the characteristics of the transport network is one of the criteria determining the classification of units in some works, there are no studies identifying homogeneous areas from the point of view of the integration potential of the transport complex. However, there are works close to it in terms of tasks.

Thus, in the research works of the Pacific Geographical Institute of the Far-Eastern Branch of the Russian Academy of Sciences the options of economic zoning of the Far East coast subject to the geopolitical interests are discussed for the study of the processes of the coastal-marine natural resources use. On the basis of a complex of factors, geographical, historical, political and others, which are interacting and have a great influence on the strategic potential of the state and its foreign policy, the five areas are highlighted: Arctic, North Pacific, Okhotsk Sea, Sea of Japan, Tumangan. The areas are different by their strategic functions, problems, and also the "vector of action", a key area of functioning of the economy. The highlighted areas have no correlation with the existing grid of administrative-territorial division and include part of the territory of the Far East, and coastal waters (*Fig. 1*) [30].

This version of the regionalization indirectly reflects the availability of potential cooperation in the field of transport with the countries of the North East Asia, but cannot be used for the author's purposes as it does not cover all the territory of the Far Eastern Federal District, but only its coastal areas.

Transport is also taken into account in other works of the team of the Pacific Geographical Institute when studying the dynamics of the economic structures of the Far East: a variant of the economic zoning and development of the region's trunk roads with the transport networks of neighboring countries is proposed [31], which helps analyze the processes of formation and development of a network of railways and roads as a result of regional economic policy (*Fig. 2*).

Figure 1. Zoning the Far Eastern coast from the standpoint of geopolitical interests of Russia

Source: Compiled by V.D. Khizhnyak using: Karkin V.P., Preobrazhensky B.V., Zharikov V.V., Stepan'ko A.A., Arzamastsev I.S., Romanov M.T. Regionalization, delimitation of coastal zones of the Russian Far East and their functional zoning In: *Coastal-Marine Management: Theory, Indicators, Regional Differences*. Vladivostok: Dalnauka, 2010. 308 pp. P. 220.

Figure 2. Economic zoning and development of trunk road network
in the Far East of Russia

Source: Compiled by V.D. Khizhnyak using: Baklanov P.Ya., Moshkov A.V., Romanov M.T. Territorial organization of the economy in the long-term development of the Russian Far East. *Proceedings of the Transbaikal State University*, 2013, no. 1 (48), p. 152.

This version of the Far East zoning also could not be accepted as a baseline for the ongoing research because: a) it does not cover the entire territory of the Far Eastern Federal District; b) it is directed to the substantiation of managerial decisions on the region's development and, accordingly, takes into account not only current but also future status of the road network; c) it takes into account the extremely limited list of parameters of the transport complex.

When assessing the potential of the Far Eastern transport system integration into the NEA transport services market, a particular interest is presented by the scheme of the economic and geographical gravitation of the constituent entities of the Russian East to the Pacific Ocean, where there are two areas within the boundaries of the Far Eastern Federal District taking into account the economic proximity to the Asia-Pacific region [32]. The first area includes the constituent entities of the Russian Federation having access to the Pacific Ocean: Kamchatka, Primorsky and Khabarovsk krais, the Magadan and Sakhalin Oblasts, Chukotka Autonomous Okrug. The second area includes the territories gravitating economically towards the Asia-Pacific region but not extending to the Pacific Ocean: the Republic of Sakha (Yakutia), the Amur Oblast and the Jewish Autonomous Region (*Fig. 3*).

This zoning corresponds the research objectives to a certain extent, but needs further elaboration taking into account the indicators of the Far East transport complex.

The approach proposed by the Economic Research Institute of Far Eastern Branch of the Russian Academy of Sciences is of considerable interest from the point of view of economic regionalization. In the framework of this approach the territory of the Far East is divided in terms of natural and social diversity of economic activity [33]. The approach offers a selection of four macroeconomic areas defined by a system of landscape zones and areas: the Extreme North (the Subarctic region), the Far North, the Middle North and the South (*Fig. 4*).

The selected macroeconomic areas allow taking into account natural factors affecting the development of the Far East transport complex and informatively justify the ongoing zoning. Therefore, when interpreting the results of cluster analysis, we will take into account the options of zoning presented in Figures 3 and 4.

The division of the Far East into smaller areas is carried out by applying the cluster analysis[2]. The calculations were made in the constituent entities of the Russian Federation as part of the Far Eastern Federal District (by the beginning of 2018, there were 9 entities of the Russian Federation: Republic of Sakha (Yakutia), Kamchatka Krai, Primorsky Krai, Khabarovsk Krai, Amur Oblast, Magadan Oblast, Sakhalin Oblast, Jewish Autonomous Oblast, Chukotka Autonomous District) and municipal districts (Khabarovsk Krai). The constituent entities of the Russian Federation in the Far East, with the exception of the Khabarovsk Krai, were considered as integral units. The territory of the Khabarovsk Krai was divided into two parts during the territories' allocation given the macroeconomic zoning (see Fig. 4): a) the Northern part, b) the Southern and Central part. The Northern part includes Ayano-Maysky, Okhotsky and Tuguro-Chumikansky municipal districts; the Southern and Central parts −Amursky, Bikinsky, Vaninsky, Verkhnebureinsky, Vyazemsky, Komsomolsky, n.a. Lazo, Nanaysky, Niko-laevsky, n.a. Polina Osipenko, Sovetsko-Gavansky, Solnechny, Ulchsky and Khabarovsk municipal districts of the region.

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[2] The program "AtteStat" was used, the connection measure is the Manhattan distance, the analysis method is King's average connection method.

Figure 3. Zone of gravitation of the constituent entities of the RF in the East of Russia to the Pacific Ocean
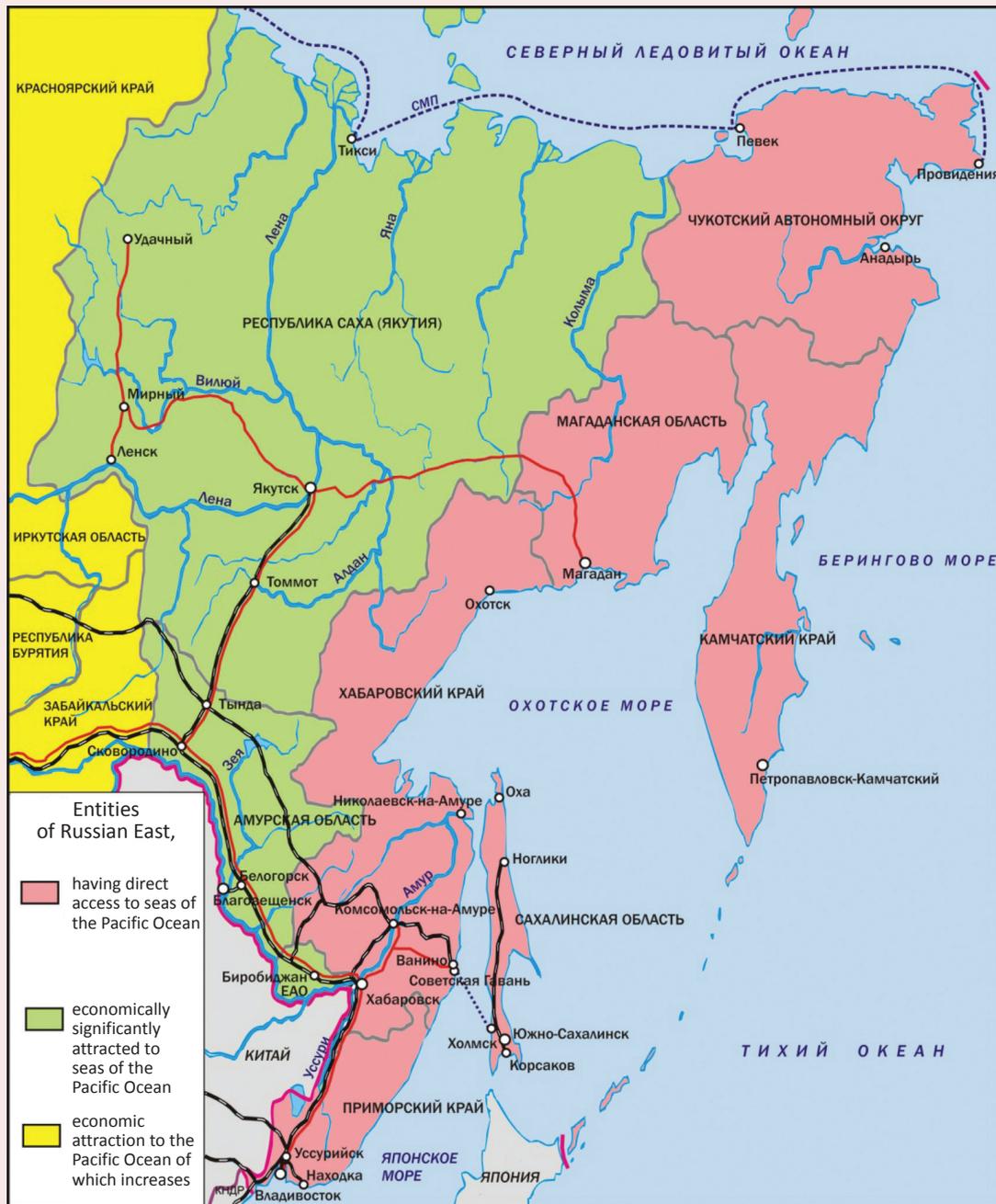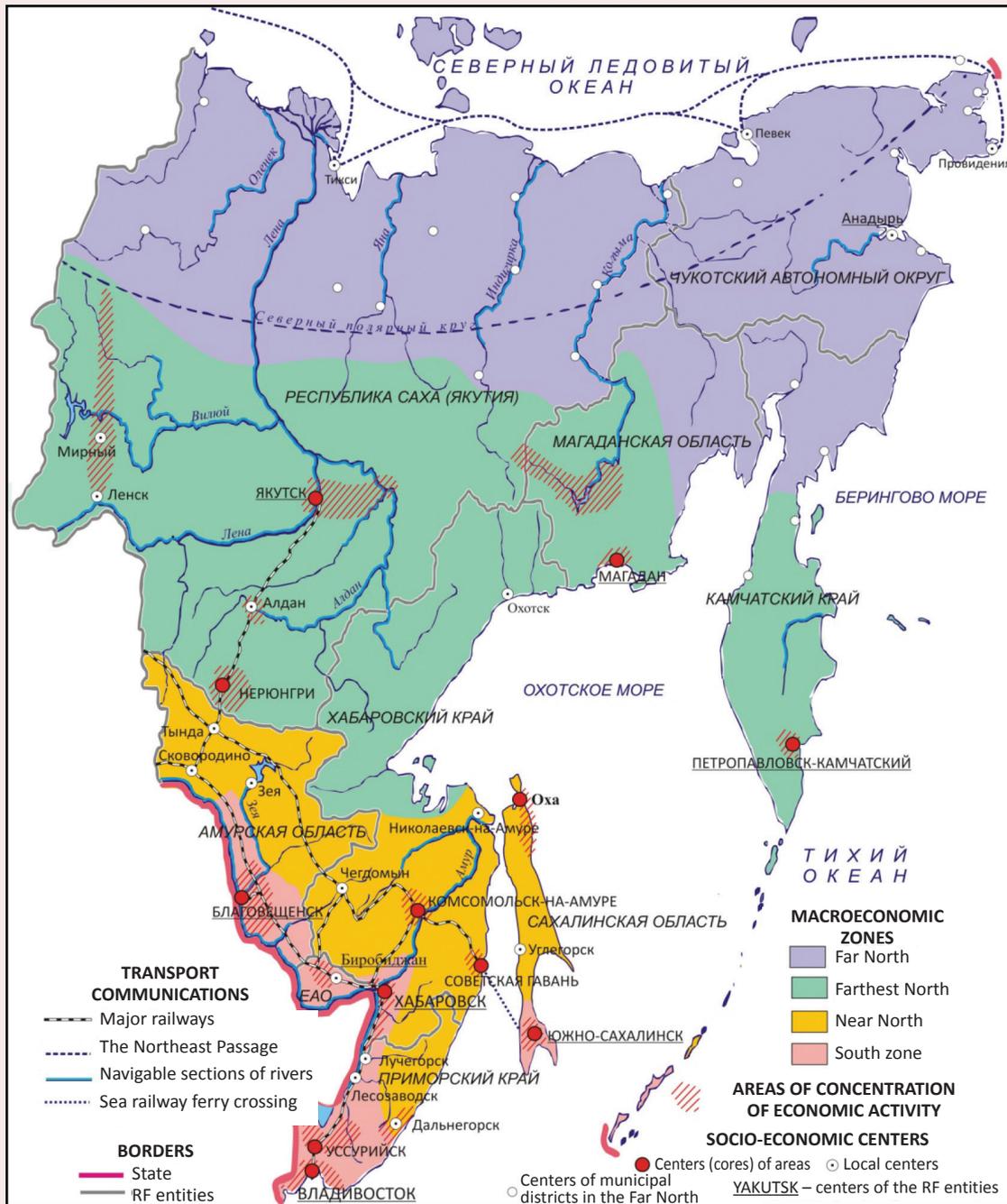

Source: Compiled by V.D. Khizhnyak using: Baklanov P.Ya., Romanov M.T. *Economic-Geographical and Geopolitical Position of Pacific Russia*. Vladivostok: Dalnauka, 2009. 168 pp. P. 48.

The cluster analysis is conducted on the basis of the indicators of development of transport infrastructure, transport system and the scale of foreign economic relations for 2018: railways density (km per 10 thousand km²), auto-road's (km per 1 thousand km²), inland waterways' density (km per 1 thousand km²), the volume of cargo transportation by railway transport[3] (million tons), the volume of cargo

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[3] Departure and arrival of cargo.

Figure 4. Macroeconomic areas of the Far East

Source: Compiled by V.D. Khizhnyak using: Vishnevskiy D.S., Dem'yanenko A.N. Intraregional diversity. In: *Pacific Russia–2030: Scenario Forecasting for Regional Development*. Khabarovsk: Economic Research Institute FEB RAS, 2010. 560 p. Pp. 160-161.

transportation by road transport (million tons), cargo turnover of road transport (million t-km), export (million US dollars), import (million US dollars), the volume of exports (thousand tons), the volume of imports (thousand tons). The official data of Rosstat and the Far Eastern customs administration were used in the calculations.

Since we used the indicators of different dimensions, they were normalized according to the range of values before conducting the clustering procedure [34]:

$$x* = \frac{x - x_{min}}{x_{max} - x_{min}} \ ,$$

where $x*$ — normalized values of the indicator;

x — the original values;

x_{min} — the minimum value of the indicator;

x_{max} — the maximum value of the indicator.

Inclusion of export and import operations of constituent entities of the Russian Federation in the Far East into the list of the analyzed indicators modifies the previously obtained only on the basis of parameters of transport networks and evaluation of transport activity [35].

Analysis and explanation of the obtained results

According to the results of the cluster analysis on the territory of the Russian Far East the five regions have been identified (*Fig. 5*): region I — Republic of Sakha (Yakutia), region II — Chukotka Autonomous Okrug, Kamchatka Krai, Magadan Oblast and the Northern part of Khabarovsk Krai; region III — South-Central part of Khabarovsk Krai, Amur Oblast and the Jewish Autonomous Oblast; region IV — Sakhalin Oblast; region V — Primorsky Krai. The transport characte-ristics in the context of the obtained results of the Far East Federal District regions' clustering are shown in *Tables 1, 2* and *3*.

Let us consider the specifics of the selected regions from the point of view of the characte-ristics of the transportation system and potential for integration into the transport market of the North East Asia.

Within *region I* the largest share in the transport structure is taken by the inland waterway. This region includes the territory of the Republic of Sakha (Yakutia), where much of the traffic is traditionally performed by river transport in the framework of the "Northern

delivery" system[4]. However, in recent years, the problems of rivers shallowing and the development of surface transport infrastructure alter the structure of transport operation [36]. The most significant infrastructure changes are associated with the completion of the construction of railway Berkakit — Nizhny Bestyakh in 2014 (area was in the mode of temporary operation for freight traffic until 2018), as well as an active roads construction, for the period of 2010-2018, the length of public roads increased by 51.7%, which makes up to 30.4 thousand kilometers[5]. Currently the railroad in Yakutia is laid up to the Nizhny Bestyakh station, the line connects the Baikal-Amur railway with the right Bank of the Lena river (the city of Yakutsk is located on the opposite bank). 5.5 million tons of cargo had been transported by means of the exploited road section for 2018[6]. On the territory of region I there is only one air checkpoint across the state border in the city of Yakutsk.

The allocation of Yakutia in a separate region seems reasonable. This constituent entity of the Russian Federation is geographically distant from the countries of the North East Asia and, consequently, cannot be integrated into the international transport market to the same extent that the southern Far East regions (region III, region V). However, large-scale construction of roads and railways creates the potential for the development of integration relations of the Republic of Sakha (Yakutia).
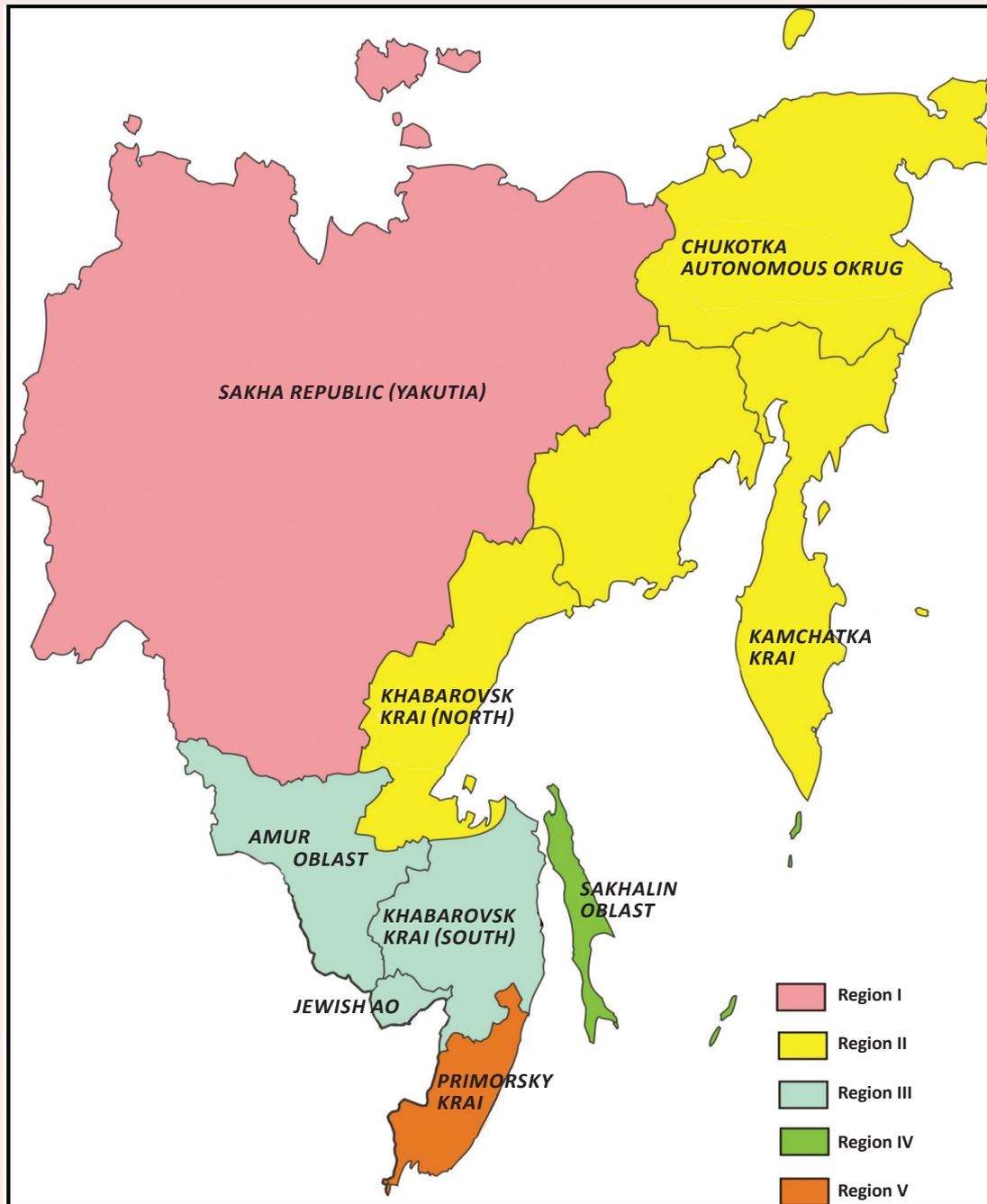
The prospects of integration of region I into the market of NEA transport services are associated with the development of land

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[4] Northern delivery is a system of annual state measures to provide the territories of the Far North of Siberia, the Far East and the European part of Russia with basic vital goods (primarily food and petroleum products) before the winter season.

[5] Length of communication routes and road infra-structure. Rosstat. Available at: https://www.gks.ru/folder/23455 (accessed: 09.10.2019).

[6] Website of JSC "Joint Stock Company "Railways of Yakutia". Available at: https://rw-y.ru/info/raskrinfo/ (accessed: 10/13/2019).

Figure 5. Division of the Far East Federal District into regions taking into account transport and economic factors

CHUKOTKA
AUTONOMOUS OKRUG

SAKHA REPUBLIC (YAKUTIA)

KAMCHATKA
KRAI

KHABAROVSK
KRAI (NORTH)

AMUR
OBLAST

SAKHALIN
OBLAST

KHABAROVSK
KRAI (SOUTH)

JEWISH AO

PRIMORSKY
KRAI

Region I
Region II
Region III
Region IV
Region V

Source: compiled by V.D. Khizhnyak using the author's data.

transport network and the increased use of the Northern sea route (NSR), a significant part of the Eastern section of which runs along the Northern borders of the Republic of Sakha (Yakutia). Thus, the current integration capabilities into the market of NEA transport services for region I are low, however, there is considerable potential.

Table 1. Characteristics of the transport networks of the allocated areas

Region	Length of transport networks, km		
	Railways	Roads	Inland waterways[*]
Region I	524.5	30353.0	7734.0
Region II	0.0	7601.7	1417.1
Region III	5575.8	29512.7	3437.0
Region IV	835.2	4987.6	0.0
Region V	1558.7	16811.2	222.0
Regions	The density of transport networks		
	Railways, km per 10 thousand km²	Roads, km per 1 thousand km²	Inland waterways km on 1 thousand km²
Region I	1.7	98.4	25.1
Region II	0.0	36.7	6.8
Region III	72.8	385.4	44.9
Region IV	95.9	572.6	0.0
Region V	94.6	1020.7	13.5
* The length of inland waterways with guaranteed dimensions of a ship course was meant. Calculated using: Transport. Rosstat. Available at: https://www.gks.EN/folder/23455 (accessed: 10.10.2019).			

Table 2. Characteristics of transport operation and foreign economic relations of the allocated regions

Region	Transportation of cargo, mln t		Cargo turnover of road transport, million ton-km
	Railway transport	Road transport	
Region I	13.1	14.3	1934
Region II	0.0	8.8	595
Region III	91.5	48.3	1315
Region IV	2.1	8.8	362
Region V	119.4	18.2	1130
Calculated using: Transport. Rosstat. Available at: https://www.gks.EN/folder/23455 (accessed: 10.10.2019).			

Table 3. Characteristic of foreign economic relations of the allocated areas

Region	Export		Import	
	thousand tons	million US dollars	thousand tons	million US dollars
Region I	6202.8	4643.0	27.5	271.6
Region II	4651.3	2384.4	84.6	248.0
Region III	8669.6	2093.1	327.0	822.9
Region IV	40396.2	15272.7	117.5	690.4
Region V	6882.8	3439.9	2106.8	4131.8
Calculated using: Transport. Rosstat. Available at: https://www.gks.EN/folder/23455 (accessed: 10.10.2019).				

For *region II* a key mode of transport is waterway, used mainly for the organization of intraregional transportation. Maritime transport serves for cabotage and coastal passenger transportation. River transport is used in the organization of the "Northern delivery".

Region II includes the territories of the Russian Far East which are the least provided with land transportation networks: Kamchatka Kray, northern part of Khabarovsk Krai, Magadan Oblast and Chukotka Autonomous Okrug. In these constituent entities of the Russian Federation (territories) there are no railways, the density of roads with hard surface is very low − 2.7 km on 1 thousand km². In the absence of year-round roads, and given the harsh climatic conditions the winter roads are widely used[7].

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[7] Roads of non-year-round functioning, for which snow is compacted and leveled by graders; ice crossings are frozen on rivers.

Although region II includes nine operating checkpoints across the state border of the Russian Federation, they do not have a significant influence on the integration potential, because the five of them operate on an irregular or seasonal basis. Only the checkpoints in seaports of Magadan, Okhotsk, and Petropavlovsk-Kamchatsky, and the air crossing point of Petropavlovsk-Kamchatsky are constantly operating.

The integration potential of the transport system of region II from the point of view of possibility of participation in the transport market of the North East Asia is expected to increase significantly when intensifying the traffic along the NSR. In this case, the ports of the constituent entities of the Russian Federation included into region II can become reference points in the organization of the movement along the NSR and will be used for communication centers allocation as intermediate and repair bases, the points of rescue units of the Ministry of Emergency Situations of Russia, etc.

Region III represents the areas having the most diversified transport infrastructure, including in the framework of cross-border interactions with the Asian region. Region III includes Amur Oblast, Jewish Autonomous Oblast and the central and southern parts of Khabarovsk Krai, i.e. territories having a developed land transportation network. The transport of this region performs transit and contact functions. The transit function means that latitudinal trunk roads and railways run through the region's territories: the Trans-Siberian and the Baikal-Amur Railways, Federal highway "Amur", through which the transportation of goods from Eastern Siberia to the markets of APR countries is performed. The contact function implies that owing to the edge position of these constituent entities of the Russian Federation transport is intended to serve external economic ties. This is facilitated by the presence of sections of the state border with China (along the river) in region III. To implement the contact function within the boundaries of region III there are 14 checkpoints across the state border, including five within the Amur Oblast, two in the Jewish Autonomous Oblast and eight in the central and southern parts of the Khabarovsk Krai. Half of them (7 points) are mixed cargo and passenger checkpoints, transporting by river in summer and by cars on ice in winter.

The integration potential of region III will increase in the future with the completion of transport infrastructure of international cooperation: the railway (Jewish Autonomous Oblast) and automotive (Amur Oblast) bridges between Russia and China, the completion of which is planned in 2020/ Thus the integration potential of region III in the transport market of the North East Asia is significant, however, the integration is likely to be limited to the cooperation with China.

The allocation of the Sakhalin Oblast into a separate *region IV* in the context of the division is explained by a combination of a poorly developed transport system and a significant amount of foreign economic relations (export, 89% of value export[8] are made up by crude oil and LNG). There are six checkpoints across the state border, including five marine ones in region IV.

The increase of the integration potential of region IV is related to the implementation of projects on transport infrastructure development. Indeed, the ongoing reconstruction of the railway network on Sakhalin island, which began in 2003 (project completion in 2020), in conjunction with the program of development of sea ports, airports and the prospective construction of a transport crossing to the mainland (bridge, dam or tunnel through

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[8] Foreign trade of the Sakhalin Oblast − 2018 / Far Eastern Customs Administration. Available at: http://dvtu.customs.ru/folder/147054 (accessed: 10/20/2019).

the Nevelski strait), will greatly enhance the capability of the transport system of region IV in cooperation with the countries of the North East Asia. Assuming positive externalities in the longer term, the implementation of transport connection of Sakhalin Island with the Islands of the Japanese archipelago is possible.

Region V includes the territory of Primorsky Krai. The territory is highly diversified by the type of transport, it has an extensive network of railways and roads, there are large transport hubs of regional and national significance. Having certain similarities with region III by the level of development of transport infrastructure, it has a high degree of implementation of integration potential currently available.

Geographically this region is the area of the outlet of the Trans-Siberian railway and a number of Federal roads to the sea ports of the Pacific coast: these are Vladivostok, Nakhodka, Vostochny. By the end of 2018 the ports of Primorsky Krai accounted for 70% of the total volume of transportation by sea[9] in the Far Eastern Federal District. There are six checkpoints across the state border of the Russian Federation in the ports.

There are 15 checkpoints across the state border in region V, including three railway border checkpoints of the Russian Federation with China and the DPRK: 1) Grodekovo (RF) – Suifenhe (PRC); 2) Makhalino (RF) – Hunchun (PRC); 3) Hasan (RF) – Tumangan (DPRK) and five car border checkpoints.

Transport infrastructure of region V continues to evolve. Having relatively high current level, the prospects of integration of region I into the transport complex of NEA are high. There is integration potential is the development of traffic via ITC "Primorye-1" and "Primorye-2" using road, rail and sea modes of transport.

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[9] The volume of inter-port transportation of goods by sea / EMISS. Available at: https://fedstat.ru/indicator/39233 (accessed: 10/20/2019).

Dispute about the results

The conducted research extends the ideas about the future scope of international transport cooperation as a condition of general economic integration in the area of the North-East Asia, and complements the analytical framework for the comparative analysis of the options of design of the international transport system in this region of the world.

The proposed zoning of the Far East is based on the attempt of taking into account the level of transport infrastructure development and the scale of foreign economic interaction of the constituent entities of the Russian Federation as part of the Far East Federal District with the countries of the North-East Asia. The obtained results allow us to assess the current capabilities of integration of the transport system of the Far East into the international transport market. The five regions allocated according to the results of cluster analysis differ in both the level of transport network development, and the scale of transport activity and foreign economic relations.

The presented zoning allows us to approach the management of integration of the Far East and the North-East Asia interactions differentially and could serve as a basis for the formation of a targeted incentive policy of the state [37].

Certainly, the research results can be refined in the future. There are two possible directions of the research development. First, a more accurate division not tied to the constituent entities of the Russian Federation may be done in case we having more detailed information on the characteristics of the Eastern regions' transport system (e.g. in the context of municipalities). Second, the future research may be conducted taking into account not only the current performance but also the ongoing/planned projects of development of transport system in Russia's Eastern regions. This will allow to understand the strategic vision for integration better.

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Structural Changes in the Economy:
Searching for Sectoral Drivers of Growth*

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Abstract. In the conditions of a system-wide economic crisis and destabilization of the external environment, the economy of the Russian Federation and its regions is experiencing structural limitations, which are associated with its imbalance. As a result, domestic demand for manufactured products is reducing; such a situation does not encourage enterprises to increase their output. This makes it necessary to search for the ways to eliminate structural disproportions and provide economic growth in modern economic conditions. One of such ways is to promote sectoral drivers of growth, that is, those industries and sectors of the national economy, the increase in demand for products in which has a significant positive impact on the economy. In this regard, the goal of this article is to identify and scientifically substantiate the need to stimulate the production of goods and services in economic sectors so as to

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promote structural changes in the economy at the national and regional levels. In this study, we consider mechanical engineering, information and communication technologies and tourism as drivers, which have a large multiplier effect and contribute to economic growth. The article assesses the consequences of stimulating the selected sectors of the economy in the context of structural changes both at the nationwide level and in the territorial context; this provision forms the scientific novelty of the study. The findings of the study reveal problems in development of mechanical engineering, information and communication technologies and tourism, confirm the importance of their development for the economy; the importance is expressed in a significant increase in the main economic indicators due to the increase in the production of goods and services. We use general scientific methods such as analysis, synthesis, comparison, generalization, and the tools based on the input-output methodology. In the future, we plan to continue our work aimed at determining the correspondence of the parameters of development of these sectors contained in the strategic documents and the results obtained in the study for a deeper understanding of the problems of structural adjustment of the economy.

Key words: structural changes, economy, economic growth, engineering, ICT sector, tourism.

Introduction. The economy of Russia and its regions is characterized by a slowdown in growth, a reduction in domestic consumer demand, household income, the dominance of the fuel and energy sector to the detriment of the development of high-tech industries, which brings to the fore the issue of structural transformations. Studies show that "... for 2009–2017, the average annual growth rate of gross domestic product in Russia was only 0.7%; one of the reasons for such a situation is the structure of the Russian economy that does not meet modern realities" [1].

The forecasts of Russian economists regarding the prospects for economic modernization of the country in 2019 and 2020 do not seem optimistic: experts, including analysts from the Center for Structural Research of RANEPA[1], the Institute "Center for Develop- ment" of NRU "Higher School of Economics"[2], Gaidar Institute of Economic Policy [2], agree that economic growth is not expected in the near future. This actualizes the need to develop directions to change the current situation, especially in connection with the task Russia has to fulfill – to enter the top five economies in the world by 2024, ensuring economic growth rates above the world average while maintaining macroeconomic stability[3]. Scientists note that currently achieving economic growth in the country is possible on the basis of promoting consumption, in particular, the growth of domestic consumer demand and investment policy [3; 4]. In this regard, there is a need to identify and scientifically substantiate sectoral drivers of growth, since the increase in demand for their products provides structural changes in the economy.

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[1] "...So far there are no real incentives for economic growth in 2020. Next year the growth will be about 1%" (source: This is our top limit: the Accounts Chamber does not believe in Russia. *Gazeta.ru*, 2019, 14 October. Available at: https://www.gazeta. ru/business/2019/10/14/12754940.shtml?updated).

[2] The immediate prospects for economic growth in the context of weak domestic demand and the unstable situation in the world economy are becoming increasingly dim (source: *Comments on the State and Business: Buletin*. National Research University "Higher School of Economics". 2019. 27 September. Available at: https://dcenter.hse.ru/newkgb).

[3] On national goals and strategic objectives of the development of the Russian Federation for the period up to 2024: Decree of the President of the Russian Federation dated May 7, 2018. No. 204.

Scientific works on the topic are dominated by the point of view of the key role of the manufacturing industry as a driver of economic growth [5]. Meanwhile, according to recent studies, the effectiveness of structural policy should be associated with the expansion of the list of directions for its implementation, which implies the creation of conditions for the development of new sectors, as well as the types of activities aimed at overcoming single-industry structure [6]. E.B. Lenchuk, Doc.Sci. (Econ.), Director of RAS Institute of Economics, points out that "searching for new drivers of economic growth is the strategic challenge for Russia..." [7, pp. 173-189].

Modern economic policy does not fully use the potential of such industries as engineering, tourism and information and communication technologies (ICT)[4], whose contribution to the formation of the tax base, promotion of employment and economic activity is quite high.

One of the reasons for this situation is the lack of information about the multiplicative effects obtained from the development of these sectors; thus, the authorities do not regard them as highly profitable and promising in terms of the possibility of changing the existing structural proportions.

Meanwhile, the development of these industries to ensure structural changes in the economy is of sufficient importance. Thus, researchers have found that the development of mechanical engineering creates prerequisites for increasing the growth rate of gross regional product (GRP) to 7−8% per year and for improving socio-economic indicators in regions of the Russian Federation [8].

The ICT sector remains undervalued in terms of providing potential multiplier effects. According to expert calculations, its contribution to the Russian economy is only 3% of GDP against 6−7% in developed countries [9]. At the same time, it has a great potential for growth, which is due to the growing demand for its services from the state, business and the population.

The prospects for the development of tourism in Russia are due to the presence of unique tourist resources and demand among the population for quality recreation. Currently, a number of systemic problems in the tourism sector prevent its noticeable impact on structural transformations. Although it is obvious that the effect on the economy from its development can be felt in a fairly short time and with relatively small investments: according to various estimates, tourism has an impact on 32-53 related industries.

Thus, the scientific hypothesis of our study is formed by the idea that the promotion of such industries as engineering, ICT and tourism stimulates consumer demand, providing an increase in indicators for all types of economic activity, ensuring the growth of the economy of the country and its regions.

In this regard, the goal of the article is to identify and scientifically substantiate the need to stimulate sectoral drivers of economic growth, the development of which contributes to structural changes in the economy at the national and regional levels. The achievement of the goal of the study requires solving the following tasks: to assess the operation and identify main barriers to the development of the considered sectors; to evaluate the effects of their stimulation on the basis of input-output models; to identify the spatial distribution of

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[4] The choice of sectoral drivers of economic growth is due to their high multiplicative effect. According to our calculations based on the input-output method, the multiplier for the machine-building industry is 2.7, which corresponds to the highest value among all branches of industrial production. In the services sector, tourism (1.9) and the information and communication technology sector (1.8) have the highest multiplier values.

these effects; to substantiate proposals for the promotion of development of these industries.

Theoretical aspects of the study. Scientific papers pay more and more attention to the issues of structural transformations of the economy; this fact confirms the relevance of research on such problems [1; 3; 4; 6; 10-18]. Scientists offer various options for changing the situation. Structural reforms can include stimulation of domestic demand and expansion of the industrial base [12]. Optimization of the economic structure is also facilitated by identifying promising industries that are able to smooth out the existing imbalances. It is noted that the structural policy for developing countries consists in searching for industries that can become drivers of growth [13].

Thus, according to scientists from RAS Institute of Economic Forecasting, it is necessary to note that in this case the goal of the structural policy is not the increase/decrease of the share of any industry in the structure of production, but "development of a functional structure of the economy, which provides the dynamics of sustainable economic growth by addressing key imbalances of demand, production and performance parameters, reducing the excessive burden on the individual sectoral complexes in the functioning of compensation mechanisms" [14, pp. 21-22].

The researchers emphasize that the structural economic policy should take into account the regional conditions of its implementation [18] and the availability of adequate statistical and analytical tools for its assessment [1].

An important direction in determining the sectors — potential drivers of growth — is to assess the effect their stimulation exerts on the economy. One of the latest works on this issue is a study by experts from the Institute of Economics and Industrial Engineering,

Siberian Branch of RAS [19], which determines the impact of national projects on the dynamics of macroeconomic and sectoral indicators of the Russian economy in 2019—2024 on the basis of a dynamic input-output model. Since the search for driver industries, the activation of which changes the structural proportions of the economy, and the definition of the consequences for the economy from their stimulation are not exhaustive, we continue to work in this direction, using input-output modeling.

The novelty of the results consists in the development of a methodology and improvement of tools for the use of input-output balance in order to assess the impact of stimulating demand for products of such industries as engineering, ICT and tourism on the economy at the national and regional levels in the context of structural changes; this distinguishes our study from similar works of other scientists.

Research methods. We used general scientific methods such as analysis, synthesis, comparison, and generalization to assess the functioning and identify key barriers to the development of the industries under consideration, and to substantiate proposals for their activation. In order to substantiate the hypothesis about the impact of stimulation of these industries on the economy of the country and its regions, we used input-output method, which makes it possible to conduct scenario-based input-output modeling of the economy.

As a forecasting tool we use an input-output model that contains the types of activities "mechanical engineering", "information and communication technologies" and "tourism", which are not presented separately in Russian statistics. We calculated tourist output and tourist added value using the methodological tools presented in [20].

We allocated these sectors on the basis of aggregation of data characterizing the shipment of goods, performance of works and provision of services by Russian enterprises in 2017, containing an expanded list of industries related to a particular type of activity.

The model is based on the basic equation of input-output balance, which in matrix form has the form:

$$x = Ax + y, \qquad (1)$$

where x is the vector of total output; A is the matrix of direct cost coefficients; and y is the vector of the final product.

The following equation was used in the modeling:

$$(E - A)^{-1} \cdot y = x, \qquad (2)$$

where E is the unit matrix; $(E - A)^{-1}$ is the matrix of total cost coefficients.

Based on the obtained matrix dependence, it is possible to calculate what should be the volume of sales of x in all sectors of the economy, if it is planned to change the final demand y, i.e., the calculation of total costs is carried out.

Here is the calculation algorithm.

1. On the basis of the data from the table of use of goods and services the matrix of direct costs A is calculated. For this purpose, the share of direct costs F_{ij} in the volume of output X_j is determined:

$$a_{ij} = F_{ij} / X_j. \qquad (3)$$

The element a_{ij} of the matrix A shows the consumption of the product i directly in the production of the unit of production of the industry j.

2. Next, the total cost matrix $B = (E - A)^{-1}$ is calculated. To do this, the matrix A is subtracted from the unit matrix E. The resulting matrix is raised to the power -1, i.e. the inverse matrix $(E - A)^{-1}$ is found.

The element b_{ij} of the matrix B characterizes the need for the gross output of the industry i, which is necessary to obtain a unit of the final product of the industry j in the process of material production. Total cost coefficients reflect all the diversity and complex indirect relationships that arise in the process of social reproduction.

3. The total cost matrix multiplied by the planned final consumption vector y_j equals the gross output of all industries x_i:

$$. \qquad (4)$$

Further, on the basis of the target indicators of the development of the driver industries set in the program and strategic documents, the forecast growth rates until 2024 were calculated. Then, on the basis of an input-output model, we calculated the volume of sales of engineering, ICT and tourism products with an increase in final demand for it, taking into account the received forecasts. We also assessed the contribution of these industries to the additional increase in the number of employees and the wage fund.

The assessment of the territorial effects generated by stimulating demand for the products of these industries was carried out for the federal districts of the Russian Federation in the national average proportions of the structure of output, the number of employees and the wage fund.

Main results of the study. Let us assess the current status and identify constraints in the development of engineering, ICT and tourism in Russia, the sectors considered in our study as industry growth drivers, stimulation of which ensures the growth of economy of Russia and its regions.

The machine-building industry has been in a state of stagnation for the last decades; the situation is aggravated by the negative influence of foreign economic factors and the internal

Figure 1. Dynamics of development of mechanical engineering in the Russian Federation, in % to the level of 2008
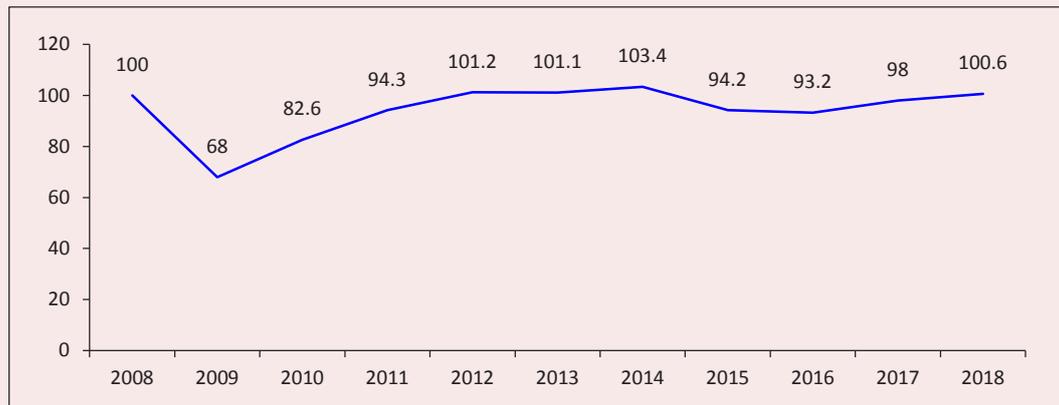
Source: own calculations with the use of Rosstat data.

economic crisis. Thus, according to the calculations of experts from IEF RAS, in 2018, its contribution to the dynamics of industrial production was 0.1% against 65% of the raw material sector [21]. This structural imbalance is reflected in the economic growth of the country as a whole. Judging by the dynamics of the development of Russian mechanical engineering in recent years *(Fig. 1)*, it is premature to talk about its steady growth, and therefore, a positive impact on the process of structural changes in the country's economy.

We can identify a number of factors that hinder the development of the machine-building industry; these factors include the use of outdated equipment, which is the cause of low quality of products and, as a result, its lack of competitiveness, as well as acute underinvestment and lack of qualified personnel [22; 23]. Meanwhile, mechanical engineering is the basic branch of the entire economy, leading to innovative development, which is one of the factors in the country's competitiveness on the world stage.

The validity of considering the ICT sector as a driver of economic growth is due to its specific features, which consist in the contradiction between the accelerated development of such technologies and their rapid "moral and physical obsolescence" that stimulate demand for new products [24].

The contribution of this sector to the Russian economy, despite the prospects for its development in terms of modernization of existing industries and the emergence of new ones, is not great.

Thus, in 2017, its share in the economy amounted to 3% of GDP or 2.5 trillion rubles, which is significantly less than in developed foreign countries [9] *(Fig. 2)*.

The analysis of scientific papers on the impact of the information and communication technologies sector on the economy has shown the prospects of its development for the purpose of structural changes. Thus, the study based on input—output tables determined that this sector contributes to the restructuring of the Japanese economy [25]. Other authors used the analysis performed on the example of 159 countries for the period from 2000 to 2009 and revealed a positive relationship between the growth rate of real GDP per capita and the index of ICT use [26].

Figure 2. Contribution of the information and communication technology sector to GDP in 2017, as a % of the total

Source: Russia: from digitalization to digital economy. Available at: http://stolypin.institute/wp-content/uploads/2018/09/issledovanie_tsifrovaya-ekonomika-14-09-18-1.pdf.

The Center for Macroeconomic Analysis and Short-Term Forecasting of IEF RAS made a forecast of the contribution of the ICT sector to Russia's GDP growth in 2018−2030, which showed that digitalization can provide conditions for almost half of the GDP growth in the target scenario [27].

Although a number of indicators point to strengthening of the processes of digitilization in Russia (wide spread of the Internet, implementation of digital projects initiated by the state), there are a number of obstacles to the more tangible impact of ICT on the economy: the low share of employment in producing information services, government's barriers to the activities of private companies engaged in the sector.

At the same time, according to experts [9], the development of the ICT sector has a great potential associated with the growth of the number of people employed in it, an increase in the number of digital projects on the part of the state, and an increase in the share of business in the Russian IT industry market.

The potential of tourism development for Russia's economy and its regions lies in the fact that this sector is one of the most important areas that stimulate domestic consumer demand [20] and eliminate structural imbalances [28].

At the same time, despite the growth of the main indicators of the functioning of Russian tourism in the segment of catering and accommodation *(Tab. 1)*, its economic effect is not fully manifested.

Table 1. Indicators of tourism development in Russia

Indicator	2011	2012	2013	2014	2015	2016	2017	2018	2018 to 2011, %
Number of collective accommodation facilities	12585	13062	14019	14583	15590	20135	20534	28072	223.1
Number of persons provided with accomodation, thousand people	34746	37399	41065	42635	44219	49284	54431	73694	212.1
Number of restaurants, cafes, bars	63505	66462	70275	76367	78661	80601	82429	85408	134.5
Number of places in them, thousand units	3359.7	3588.6	3832.4	4169.9	4306.2	4360.4	4388.0	4534.1	135.0
Source: own calculations with the use of Rosstat data.									

Figure 3. The share of gross added value of the tourism industry in the gross domestic product of the Russian Federation, in %
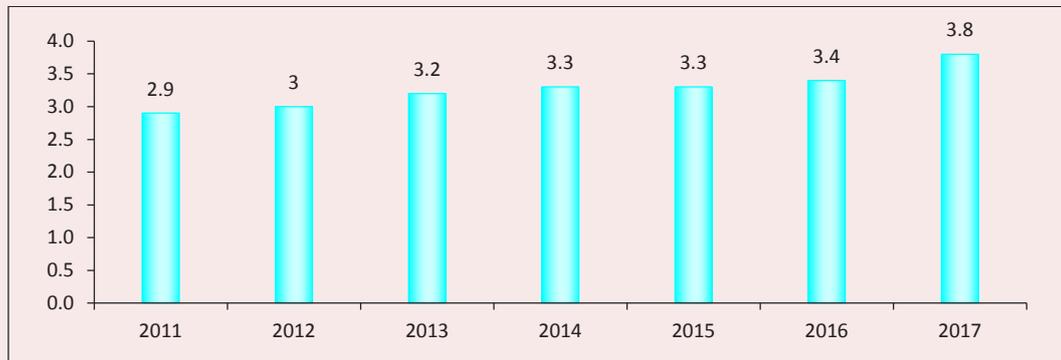
Source: Rosstat data.

Figure 3 shows the contribution of tourism to Russia's gross domestic product. In 2017, its share in the structure of the Russian economy was 3.8% (for comparison: in China – 11%; in France – 9.5%; in the United States – 7.8%[5]). However, we should note that cross-country comparisons for this indicator are approximate due to the lack of a common methodology for its calculation.

However, it seems to us that the contribution of the gross added value of tourism to Russia's economy may be much higher, given the fact that the tourist mobility of residents within the country is extremely weak. This is confirmed by the results of sociological surveys conducted by VTsIOM, according to which on average less than half of Russian residents travel around the country during summer holidays *(Tab. 2)*.

Table 2. Places where Russians go on holiday in the period of summer vacation

Answer	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
At home	55	56	48	45	46	40	45	47	45	44
At my dacha, at my private subsidiary plot	19	19	25	22	22	26	35	29	34	26
In another Russian city or village	9	9	9	11	4	11	9	12	14	9
On the Black Sea coast of the Caucasus (Sochi, Tuapse, Anapa, etc.)	10	8	10	10	9	10	8	11	12	9
In the Crimea	2	2	2	2	9	7	8	10	9	6
Abroad (outside the former USSR)	5	5	8	9	6	6	3	6	4	10
In other places on the territory of the former USSR (except the Baltic States)	2	2	2	2	1	1	1	2	3	2
in the Baltic States	0	0	0	1	0	0	0	1	1	1
I find it difficult to answer	7	6	5	6	5	8	6	4	4	4
Source: Summer 2019: vacation plans and preferences of Russians. VTsIOM. Available at: https://wciom.ru/index.php?id=236&uid=9710										

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[5]   World Travel & Tourism Council data.

Moreover, the tendency of the majority of Russians to spend their holidays without leaving the borders of their permanent residence is quite stable and does not virtually change over time: over the past seven years, the share of such respondents has varied slightly — in the range from 44 to 48%.

The potential for the development of the sector is seen in increasing domestic tourist consumption, and primarily through the activation of domestic tourism. Thus, in the Strategy for Tourism Development in the Russian Federation until 2035, one of the targets is a twofold increase in the number of trips made within the country, per resident. In addition, the reserves for increasing the contribution of tourism to the economy in the context of structural changes are to increase the availability of tourist services for the population and for certain categories (children, pensioners, older persons, large families, etc.).

The priority of development of the considered sectors-drivers for the Russian economy is enshrined in strategic documents and development programs. Thus, the state program of the Russian Federation "Development of industry and increase of its competitiveness"[6] includes the growth rate of the industrial production index of the machine-building industry until 2020, which can be used to assess its dynamics in the medium term.

In the passport of the national project "Digital economy"[7] it is planned to increase internal expenditures in GDP for the development of the digital economy from 1.7% in 2018 to 5.1% by 2024.

The Strategy for Tourism Development in the Russian Federation until 2035[8] states that the contribution of tourism to the country's GDP in comparison with the level of 2017 should increase by 5.1 times.

The targets for the sectors under consideration have allowed us to calculate the average annual rate of their growth and determine the dynamics of their development for the period up to 2024, i.e. by the time when the Russian economy should become one of the top five in the world. The results of the calculations are presented in *Table 3*.

The obtained forecast shows that by 2024, with the set growth rate, the ICT sector should grow the most among the considered industries — by 2.7 times.

The implementation of measures for the development of mechanical engineering, ICT and tourism will contribute to the growth of demand for their products, which is laid down in the framework of the above forecast growth rate of the sectors.

Table 3. Forecast growth rates of engineering, ICT and tourism in Russia in 2018–2024

Sector	Average annual growth, in %	2018 to 2024, fold
ICT	118	2.7
Tourism	111	1.9
Machine building	104	1.3
Source: own calculations.		

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[6] On approval of the state program of the Russian Federation "Development of industry and increasing its competitiveness": Resolution of the RF Government dated 15 April 2014 no. 328.

[7] Passport of the national program "Digital economy of the Russian Federation": approved by the Presidium of the Council under the President of the Russian Federation for Strategic Development and National Projects, December 24, 2018 No. 16

[8] The Strategy for Tourism Development in Russia until 2035: approved by the Resolution of the Government of the Russian Federation of September 20, 2019 No. 2129-r.

The calculations carried out on the basis of the formed inter-industry model allowed us to determine the importance of stimulating these industries for the economy of Russia and its regions.

In particular, it is revealed that six years of active stimulation of engineering, ICT and tourism sectors will provide additional GDP growth of 4.1 %, and its annual growth only from their development will be 0.7%.

Gross output in the economy as a whole for 2018−2024 will increase by 4.7%, including: tourism − by 2.4 times, mechanical engineering − by 16.1%, the ICT sector − by 2.4% *(Tab. 4)*.

The growth of demand for the products of these sectors will require an increase in the number of employees and the wage fund. According to calculations, the additional increase in the number of employees will be 1,868 thousand people, in the wage fund − 864 billion rubles.

Despite the positive effect on the economy caused by the stimulation of these areas, it is noteworthy that the effect of the activation of mechanical engineering and the information and communication technologies sector in comparison with the tourism industry is not so pronounced. The reason for this lies in the fact that in the formation of the resources of the

Table 4. Effect from the stimulation of mechanical engineering, ICT sector and tourism for the Russian economy

Type of economic activity	Increase in gross output, in %	Increase in gross output, in billion rubles	Increase in the number of employees, thousand people	Increase in the wage fund, billion rubles
Agriculture, hunting and forestry	101.8	67.5	27.2	7.8
Fishing, fish farming	103.3	6.6	2.0	1.6
Extraction of minerals	101.6	118.1	15.8	14.2
End-demand manufacturing	102.6	173.2	72.9	27.9
Manufacturing of investment demand (without mechanical engineering)	102.0	21.2	8.5	3.1
Intermediate demand manufacturing	103.5	411.1	43.2	25.7
Machine building	**116.1**	**880.3**	**391.7**	**196.2**
Production and distribution of electricity, gas and water	103.0	178.9	61.9	29.9
Construction	100.7	50.8	16.1	6.5
Wholesale and retail trade	101.5	214.0	86.1	33.2
Tourism	**240.6**	**1750.2**	**793.9**	**324.0**
Hotels and restaurants (without tourism)	103.5	25.4	14.9	3.9
Transport (without tourism)	104.6	289.4	138.0	70.9
Communication (without ICT)	116.0	23.3	42.7	24.1
Information and communication technologies (ICT)	**102.4**	**70.6**	**18.6**	**14.1**
Financial activity	103.4	100.3	35.3	35.9
Operations with real estate, renting and business services (excluding ICT)	102.8	316.8	40.6	14.7
Public administration and military security; social security	100.3	19.4	11.5	6.0
Education	100.1	2.6	6.8	2.5
Health and social services	100.1	2.0	3.0	1.1
Provision of other public, social and personal services (without tourism and ICT)	100.9	12.1	37.9	20.7
In the economy as a whole	**104.7**	**4733.6**	**1868.4**	**864.1**
Source: own calculations.				

products of these industries, mainly imported products are used, while the formation of the gross added value of tourism is formed at the expense of its own resources. In particular, we can note that Russian companies use mainly imported software; the share in the cost of its purchase is more than 70% [9]. In the machine-building industry, the share of domestic products in the domestic market is also not great: according to some estimates, in 2014, the dependence on foreign equipment in such key areas as machine tools and heavy machinery reached 80−90% [29]. The results of our calculations are consistent with the conclusions of researchers who are engaged in assessing the multiplicative effects of output growth in various sectors of the economy based on input-output tables. Thus, the work of scientists from IEF RAS proves that in those sectors which are characterized by a higher share of expenditure on imported equipment in the total capital costs (particularly in engineering), the reduction in estimates of the effect of the increase in value added is greater than in others [30].

Thus, further stimulation of these industries will develop not the domestic economy, but the national economy of the importing countries, which calls into question Russia's transition to high-tech development.

According to our calculations, the use of only domestic equipment in the ICT sector will further ensure GDP growth of 0.08%. In this case, in the economy as a whole, gross output will increase by 0.13%, the number of employees − by 0.12%, and the wage fund − by 0.11%.

The tools we used made it possible to identify the distribution of the effect of stimulating these industries in the territorial context. In particular, the increase in output in the context of federal districts was calculated *(Fig. 4)*.

According to the results of calculations, the Central Federal District will feel the greatest effect of stimulating engineering, ICT and tourism; this fact is quite expected and is explained by the location of the federal city of Moscow, which is the center of attraction for both domestic and inbound tourists,

Figure 4. Increase in gross output due to the stimulation of consumption of goods and services of mechanical engineering, ICT and tourism (total) in the context of federal districts, billion rubles
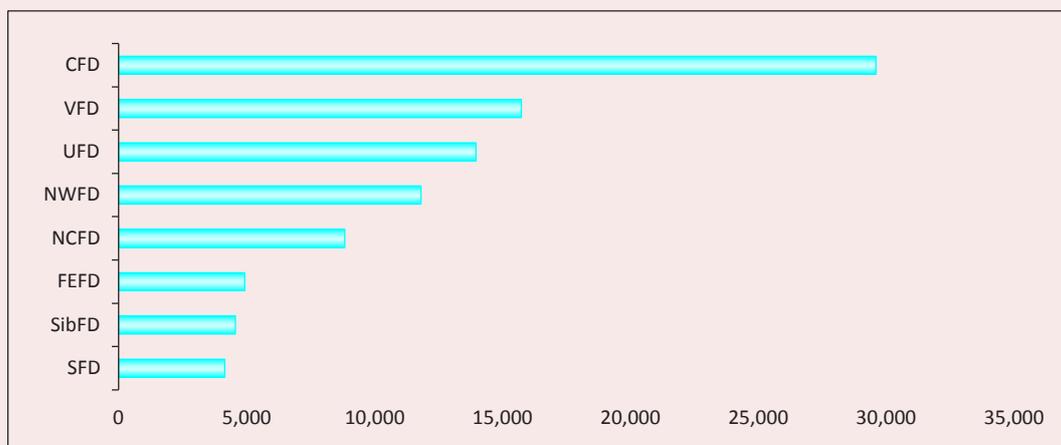
Source: own calculation.

Figure 5. Territorial distribution of the effect of stimulating tourism in the Russian Federation, in % to the total
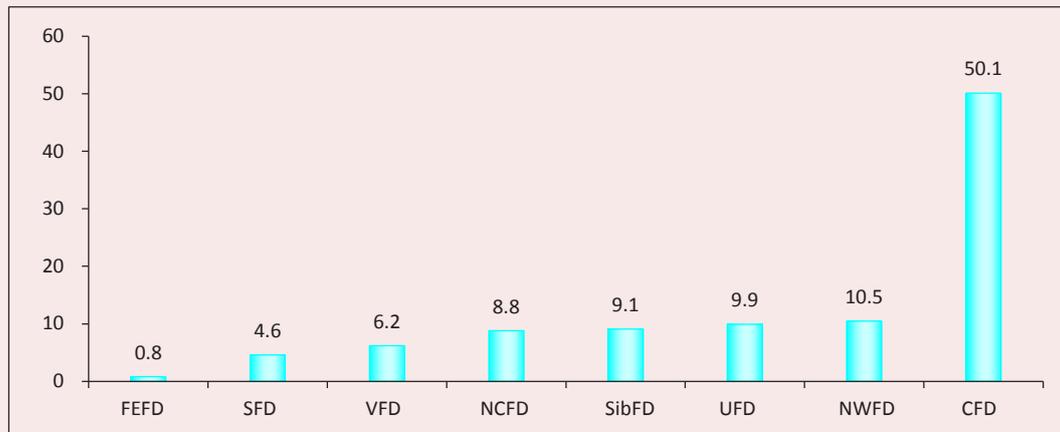
Source: own calculation.

as well as the leader in the development of communications and information technologies in Russia. Due to this, this district is significantly ahead of the rest of the territory. So, the lag of its nearest neighbor – the Volga Federal District – is almost twice.

Let us analyze in more detail how the effect from the growth of demand for the products of each of the considered sectors will be distributed in the regions. Thus, the increase in the output of the tourism industry will have the greatest effect on the Central Federal District: its share will be 50% *(Fig. 5)*, while the values of this indictor in the Northwestern Federal District, Ural Federal District, Siberian Federal District and North Caucasian Federal District will be significantly lower. These territories occupy approximately the same position – their share in the industry ranges from 8.8 to 10.5%. This indicates the presence of territorial imbalances in the development of tourism in Russia and the need to create new tourist centers.

We should note that the share of the Far Eastern Federal District in the sector under consideration is quite low – 0.8%, which is probably due to weak tourist activity in this region, which occupies about 40% of the territory of Russia[9], despite its high tourist and recreational potential.

As for the stimulation of the machine-building sector, it will most significantly affect the Central, Volga and Northwestern federal districts, since these territories are the centers of machine-building in Russia *(Fig. 6)*. It is worth adding that the leadership of the Central Federal District is not so noticeable in comparison with other federal districts, and this indicates the need to build up the potential of this sector in them. The Southern Federal District, which will account for 0.9%, will have the least effect on the increase in consumption of machine-building products.

According to our calculations, the Central Federal District will have the greatest effect in stimulating the information and communication technology sector – its share will be almost 50% *(Fig. 7)*. However, the Volga and Northwestern federal districts have a similar share in this sector – about 12–13%. This indicates the potential of the Russian regions
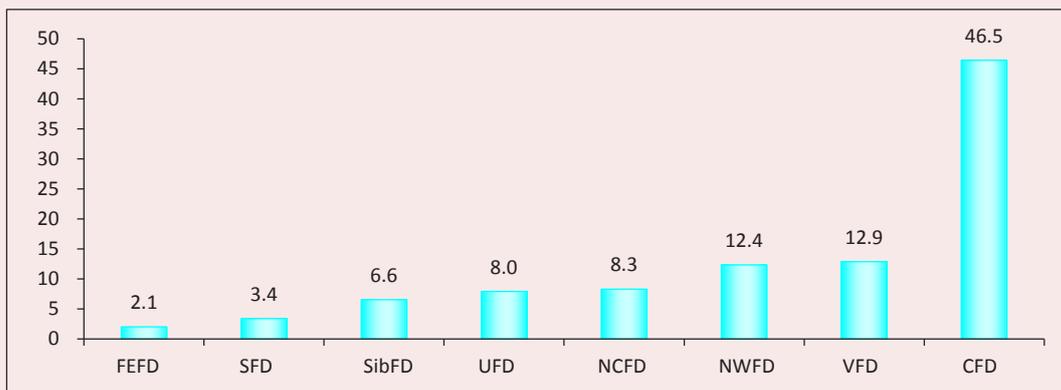
[9] The Far Eastern Federal District is the largest federal district in Russia; it covers an area of 6,952,555 km².

Figure 6. Territorial distribution of the effect of stimulating mechanical engineering in the Russian Federation, in % to the total
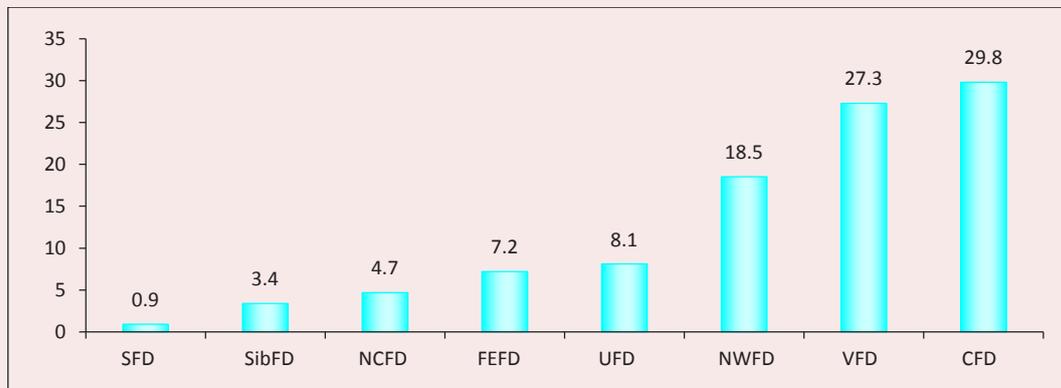
Source: own calculation.

Figure 7. Territorial distribution of the effect of stimulating the ICT sector in the Russian Federation, in % to the total

Source: own calculation.

in the process of creating added value generated from the products of the digital industry. At the same time, the Far Eastern Federal District with a share of 2.1% will again become an outsider, as well as in the case of distribution of the effect of increasing demand for products and services in the tourism sector (0.8%).

Thus, the assessment of the distribution of the effect across Russia and in the territorial context has led to the conclusion that it is important for Russia's economy to stimulate the industries that are considered as drivers of economic growth.

The study made it possible to draw the following conclusions.

1. Stimulating industries such as engineering, ICT and tourism contributes positively to Russia's GDP growth rate. An increase in demand for the products of only these three industries in 2018−2024 further promotes economic growth by 4.1%. At the same time, it is worth considering that a significant problem in this process is the predominance of foreign-made products in the mechanical engineering and in the digital industry. It seems that creating conditions for the production of high-

quality domestic equipment will help further increase the contribution of these sectors to the economy.

Increased development of driver industries will make it possible to complicate the structure of the Russian economy in the direction of increasing the share of high-value-added industries producing high-tech products and increasing domestic consumer demand for goods and services.

2. The results of our cross-industry modeling allowed us to evaluate the effect of stimulating driver industries in the spatial aspect. The observed significant territorial imbalances in the direction of the Central Federal District, which will receive the greatest effect from the projected growth in demand for engineering products, the ICT sector and tourism, dictate the need for more rational and effective development of the remaining territories, taking into account their specifics.

It is alarming that a number of regions, including the Far Eastern and Southern federal districts, are among the outsiders in terms of the effect generated by the driver industries, which indicates the need to review the policy in terms of balanced development of territories with regard to a more rational investment policy.

3. In order to boost the demand for goods and services produced by the driver industries under consideration it is necessary to implement the set of measures aimed to remove barriers to their development; it is possible through the formation of additional consumer demand for domestic products (engineering and ICT), embedding in the interregional production process chain (for mechanical engineering), higher consumption and investment attractiveness of the tourism industry.

4. The formation of demand for goods and services in the engineering, ICT and tourism sectors requires the necessary level of investment. Sources for strengthening the investment component can be found in the funds generated as a result of the redistribution of income from the export of raw materials, attracting financial resources of the population and the budget, as well as by creating attractive conditions for business investment in these industries.

Summing up, it is worth noting that Russia and its regions have a potential for the development of industries, which must be used to change the existing structural imbalances. At the same time, the task of management bodies should include the implementation of a policy on implementing this potential by creating the necessary technological base, forming an appropriate demand for products and services, taking into account its uneven territorial aspect. The development of the machine-building industry, the ICT sector and tourism contributes to the acceleration of GDP growth, improving the efficiency and competitiveness of the economy of Russia and its regions in the long term.

Scientific significance of the study consists in the development of scientific provisions regarding the identification of sectoral drivers of economic growth, the development of methodological tools to assess their impact on the economy of the country and regions on the basis of input-output tables. Practical significance of the study lies in the possibility of using its results by the authorities in determining the directions that ensure structural changes. In the future, it is planned to continue working to determine the correspondence of the parameters of development of these sectors set out in the strategic documents and the results obtained in the study for a deeper understanding of the problems of structural adjustment of the economy.

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Analyzing and Classifying the Implications of Employment Precarization: Individual, Organizational and Social Levels*

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Abstract. Currently, the concept of employment precarization is one of the most discussed topics in the field of social and labor relations. It is due to the fact that this phenomenon affects more people than unemployment and poses a threat to the provision of decent working conditions in modern economic environment, when flexible forms of employment are coming to the fore. Their use, despite many positive aspects, often leads to the destabilization of labor relations, the effects of which go far beyond the specific workplace. In this regard, the goal of our article is to study and classify the implications of employment precarization at different levels of society organization. We use general scientific methods such as critical analysis, generalization, comparison, and classification, which serve as the basis for the analysis of domestic and foreign scientific literature on the subject. The findings of our study prove that the effects of employment precarization are indeed multifaceted. At the individual level, this is manifested in the deterioration of material well-being, social security and health, and also in the uncertainty of personal/

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family and professional prospects. There may be benefits in the framework of the organization, but the destabilization of labour relations poses far greater threats, such as reduced productivity, increased staff turnover, and increased costs associated with the health and safety of employees. All this can have a negative impact on the life of society as a whole, affecting the functioning of the labor market, the degree of social cohesion, the stability of the political situation, the scale of social inequality and social exclusion, and the pace of socio-economic development. The prospects for further research are to consider the implications of employment precarization, taking into account the specifics of the social and labor sphere in Russia.

Key words: employment precarization, labor market, unstable employment, non-standard employment, social and labor relations, precariat.

Introduction

Global mobility of capital and labor, the widespread introduction of digital technologies, demographic ageing, and other trends in modern society have a significant impact on the sphere of social and labor relations. This applies not only to the redistribution of labor between economic sectors, but also to the essential foundations of the way in which the labor process is organized; in particular, flexibility has become one of the most important characteristics of this process. As a result, since the mid-1970s, non-standard forms of employment (temporary, part-time, self-employment, contract and agency labor, etc.) have been swiftly developing; they are fundamentally different from full-time employment and the indefinite employment contract with the employer, which is traditional for the industrial era [1, pp. 3-4]. The intensity of the changes can be seen in the data on working hours in OECD countries: in 1970–2018, the average number of hours worked per year decreased[1] from 1,975 to 1,734. At the same time, new forms of employment are emerging (freelance, telework, service types of work, etc.); they significantly expand the opportunities for direct interaction with customers. According to the estimates of Russian scientists, the share of non-standard workers in Russia tends to grow and is approaching 20% [2, p. 343].

However, the implications of such changes are very contradictory. On the one hand, the spread of non-standard employment increases the economic activity of the population (espe-cially representatives of vulnerable groups) and reduces labor costs, provides favorable conditions for combining work and life, professional self-realization, etc., which has a positive effect on the actors of the labor market. On the other hand, the flexibility of labor relations often leads to a decrease in the stability of employees' position [3], which in the scientific literature is associated with the process of precarization of employment, which characterizes the growth of instability. Despite the lack of conceptual and terminological clarity, many scientists point out an extremely negative impact of this phenomenon on the quality of working life. As a rule, this leads to a situation called precarious employment, when the employee is forced to face unfavorable working conditions, social insecurity, reduced or delayed wages, high risk of job loss[2], etc., which may ultimately affect the overall stability [4]. Currently, precarization of employment is increasingly seen as a global challenge, the implications of which cover a wide variety of life spheres [5].

[1] Hours worked. OECD Data. Available at: https://data.oecd.org/emp/hours-worked.htm

[2] Non-standard employment around the world: Understanding challenges, shaping prospects. ILO. Available at: http://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_534326.pdf

In the framework of the present study, we understand employment precarization as a process of destabilization of labor relations due to their transformation, which is manifested in a decrease in the stability of the position of employees and society as a whole. In contrast to the majority of interpretations, the definition we propose clearly reflects the essence of the phenomenon under consideration, the nature and scope of its consequences; the absence of excessive particularities allows us to address a wide range of problematic issues, which, taking into account cross-country features, is very promising.

In the absence of objective criteria for precarious employment it is difficult to determine the real extent of the problem. Today, precarization processes are usually interpreted through the prism of precarious employment, which is evaluated by indicators of the informal sector [6], various forms of non-standard employment and incomplete unemployment [7], working conditions [8], income level [9], social insecurity [10], and others. In addition, synthetic indicators calculated on the data of sociological surveys [11, 12] are very popular. As a result, depending on the accepted criteria, the involvement in unstable labor relations can vary significantly: 22% in Canada (2015) [13], from 4% to one third of all employees in the United States (2014−2017) [14], from 50 to 76% in Russia (2016) [15].

Employment precarization is characterized as a systemic risk, the study of which requires an approach that takes into account the versatility and scale of its consequences, the complexity and interdisciplinary nature of the study [16, p. 47]. Therefore, the formation of a holistic view of the possible effects caused by the spread of this phenomenon is an urgent scientific task. This is facilitated by the fact that the academic community pays special attention to the quality of employees' working lives, while the organizational and social levels often remain outside the research focus. However, in the interests of effective labor and employment policies, it is necessary to consider the manifestations of precarization in the "individual−organization−state" complex, since the processes occurring at different levels of the organization of society are interconnected and mutually affect each other. Hence, the goal of this research is to study and classify the implications of employment precarization at the individual, organizational, and social levels.

Materials and methods

As it was mentioned earlier, in modern scientific literature there is no consolidated point of view on the essence of the process of precarization, which is expressed in the vagueness of the existing conceptual apparatus and methodological pluralism in approaches to the study of precarious labor relations. In most cases, these include such forms of employment as temporary, casual, part-time, seasonal, reserve, informal, self-employment, etc. Although experts from the International Labor organization (ILO) point out that signs of precarization can be observed in standard employment[3] as well as in non-standard employment. As a result, when addressing a large number of works in this field, we find it quite difficult to adhere to any one point of view. In this regard, we have tried to look as broadly as possible at the problem of destabilization of labor relations. For this purpose, in the course of the analysis, we considered publications on the implications of employment precarization without taking into account theoretical and methodological differences, which imposes some restrictions on the findings.

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[3] Non-standard employment around the world: Understanding challenges, shaping prospects. ILO. Available at: http://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_534326.pdf

It should also be noted that precarization trends in the field of labor characterize the situation primarily in the most prosperous countries, where the standard model of employment has been established by law, and it grants employees a certain level of social security. It is very difficult to speak about the stability of labor relations in many poor regions of the world, which is confirmed by the ILO data for 2018, according to which the scale of precarious employment in these territories exceeds[4] 70%. However, even in developed countries, social security systems differ markedly, so the consequences of employment precarization may have their own specific features in the cross-country context.

The information base of the research was provided by domestic and foreign scientific works on the problem under consideration. The selection of scientific literature, mainly empirical, was made using the keywords from the databases Google Scholar, Scopus, Web of Science and RSCI. Then, based on the analysis of the abstracts, works were selected that dealt with the topic of the implications of employment precarization. At the last stage, the remaining publications were organized into three groups in accordance with the analytical framework of this study.

We used general scientific methods of critical analysis, generalization, comparison, classification, based on system-logical and interdisciplinary approaches. As a result of the study we developed a classification of the implications of employment precarization at the individual, organizational and social levels.

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[4] Vulnerable employment is not synonymous with unstable employment as a result of the precarization process. Vulnerable employment is contributing family workers and own-account workers as a percentage of total employment (source: Vulnerable employment (modeled ILO estimate). World Bank Open Data. Available at: https://data.worldbank.org).

Implications of employment precarization: individual level

Most studies on the subject of precarization of employment focus on the impact of this phenomenon on the quality of working life, which directly affects an individual's ability to work. In this case, the destabilization of labor relations is perceived only from a negative point of view, since the instability of the employee's position is not voluntary (as is the case, for example, with non-standard forms of employment), but is the result of forced circumstances and does not imply any benefits. In addition, practice shows that the consequences of precarization go far beyond the social and labor sphere.

Financial situation and social security. A study conducted on the data from the Russian Monitoring of Economic Situation and Population Health at the National Research University-Higher School of Economics (NRU HSE), revealed the negative impact of precarious employment on the income of workers [17, p. 61]. At the same time, it was proved that in the case of one vulnerability factor, the average income decreases by 13.6%, and in the case of two − by 20.5%. Data from the Canadian PEPSO study confirm differences in income between households and persons in precarious employment compared to guaranteed employment [18, p. 38]. In 2011−2014, the gap was approximately 40,000 USD per year and showed a tendency toward growth (on average by 5%).

The situation is aggravated by the fact that, since the destabilization of labor relations usually leads to the loss of social guarantees, employees do not receive paid sick leave and vacation, and a compensation for unfavorable working conditions [19, pp.18-20]. In turn, employers do not pay insurance premiums to the Pension Fund. In the end, all this can lead to financial distress and affect access to quality

medical care and decent housing [20], the consumption of quality goods and services, and the well-being of children [21]. In particular, studies in Canada have shown that one in ten and one in three precariously employed people from low-income households report, respectively, that they "have no money even to buy food frequently" and "from time to time" [22, pp.67-73]. The same situation was found in relation to the payment of various expenses related to the preparation of children for school and extracurricular activities. In addition, due to limited financial opportunities, such workers simply cannot buy their own housing, so they live with their parents (or other relatives) or are forced to rent low-cost housing, sometimes with flatmates [4, p. 80]. As a result, there is a so-called "instability trap" [10, pp. 48-49], in which the material and time costs of the employee are not compensated by the income received in conditions of unstable employment. On the contrary, employees are often forced to accept an unpaid increase in the workload and in the number of job duties, otherwise they can lose their job [23, p. 40-41].

Health of employees. Our analysis shows that in the scientific literature there is a close relationship between employment precarization and the health of the employee. In such a case, instability is considered as a social factor in health [24]. Due to weak social security, unsettled working conditions, etc. such labor relations expose an individual to a high level of injuries and morbidity in the workplace [25]. According to the Canadian National Population Health Survey, in 1998 compared with the national average, in the situation of precarious employment, respondents assessed their condition significantly worse [26, p. 30]. Some researchers also associate various manifestations of precarization with an increased risk of alcohol and drug use [27, 28]. In addition, some studies have identified the impact of job

insecurity on the risks of sexual harassment and violence. Thus, Australian and Canadian workers who are employed temporarily or part-time, as opposed to permanently employed, are subject to significantly greater threats in this regard [29; 30, p. 10].

Studies show that the destabilization of labor relations has particularly negative effects on the psychological well-being of individuals [31]. Many works in this area that according to a number of experts originate in the Job Demand-Control model of R. Karasek [32] associate a decrease in job satisfaction, exhaustion and depression with a low level of control on the part of employees and high costs of psychosocial efforts, which in the long term can lead to diseases caused by stress [26, p. 30]. Based on data on more than 2.7 million workers, F. Moscone and colleagues found a causal relationship between employment precarization and the appointment of psycho-tropic drugs [33]. At the same time, it was found that the transition from permanent to temporary work increases the risks of mental health deterioration. Similar results obtained in South Korea proved the relationship between the occurrence of severe symptoms of depression (including suicidal thoughts) and precarious employment [34, 35]. Data from in-depth interviews with Swedish residents who have experience of such labor relations indicate that they experienced continuous stress due to the uncertainty of maintaining their job, its schedule and prospects, and the desire to find a permanent job [22]. Moreover, this may affect the health of the spouse [36]. As a result, the increased instability of the employee's position leads to the fear of being "locked up" in such jobs, which is interpreted as a "loss of control" with corresponding negative consequences for health, in particular the deterioration of mental health, especially among youth and middle-aged people [37]. It should be noted

that some researchers attribute the anxiety and negative emotions of an individual concerning their work to subjective factors contributing to the precarization of labor relations [38]. In addition, the occurrence of abnormalities in mental health can affect the physical condition. Those workers who are more likely to experience anxiety are more likely to suffer from common psychosomatic complications, including insomnia, headaches, and decreased overall self-esteem [39].

Although many studies have not revealed significant gender differences in the subjective perception of health among precariously employed workers [40, 41], there is an opinion that due to a number of factors (gender segregation, greater exposure to labor discrimination, the need to combine labor and domestic responsibilities, etc.), precarization of employment can cause more harm to the health of women than men [42]. At the same time, in the framework of the National Health and Nutrition Examination Survey in South Korea, results were obtained indicating that non-standard working conditions for men are more often associated with diseases of the musculoskeletal system and liver, and for women — with mental disorders [43]. However, according to experts, studies of employment precarization as a new social determinant of the health of workers and their families are in the initial stage and require further assessments [44, p. 233].

Future planning and family well-being. The lack of job security imposes uncertainty on the personal life of employees and their plans for the future [45], hinders the ability to make key decisions about personal life and family formation [46, 47]. For example, older people who are in unstable labor relations, although they plan to retire later than those who are engaged in more stable work, decide to retire early due to unfavorable working conditions

[48]. The instability of employment can negatively affect the reproductive attitudes of employees, since there are no guarantees of parental leave, and the risk of job loss increases [49, p. 86]. Data from the longitudinal study Swiss Household Panel show that job instability in general reduces the implementation of intentions in men and women with regard to childbirth [50, p. 19]. There is a delay in the implementation of such important personal events as the creation of serious relationships and raising children [51]. In addition, individuals involved in precarious employment cannot spend as much time with their family as they would like, because of the inconvenient work schedule and the need to find additional sources of income [22]. As a result, the work-life balance is disturbed, the probability of stressful situations increases, which negatively affects the family well-being and life satisfaction in general.

Opportunities for professional development and professional experience. Precarization of employment has a negative impact on human capital; in particular, employers in such conditions limit investment in the education of employees. Sometimes they have to pay for their own training in order to maintain a job or increase the chances of getting a job with more favorable conditions [18, p. 57]. In addition, in cases where an individual does not have an employment contract, the accumulation of work experience is not officially recorded, which may become an obstacle to employment for more worthy vacancies in the future. According to a study conducted in The Netherlands, the unstable nature of work at the beginning of a working career leads, as a rule, to an unfavorable employment situation in the future (for example, workers who started their work with temporary employment are likely to be employed for temporary work after reaching 35 years as well) [52, p. 16]. In addition,

uncertainty and short-term employment relationships negatively affect the satisfaction with their professional experience; such employees can even feel its absence [53, p. 47]. The situation may be aggravated if an employee who has a precarious job holds a position in which they cannot fully use their knowledge and skills and therefore do not implement their potential to the fullest extent. As a result, their connection with the profession is destroyed [54, pp. 59-62], i.e., deprofessionalization develops.

Implications of employment precarization: organizational level

The effects of precarization of labor relations go far beyond the activity of specific individuals. This sooner or later affects those organizational structures that create such conditions for their employees [55]. Although the number of studies on the individual level of manifestations of employment precarization is much greater than on the organizational and social levels, it can be noted that there are both benefits and risks for employers who resort to destabilization of labor relations *(Table)*.

Among the main "incentives" to use the forms of employment that are most susceptible to volatility we can highlight the following: problems with the financial situation, changes in the needs of the organization, tax obligations, opportunities, personnel rotation, etc. At the

Expected benefits and risks of precarious employment relationship for the employer

Benefit/risk	Essence
Expected benefits	
Short-term cost savings and reducing long-term obligations	Short-term cost savings are achieved due to the fact that some categories of workers, characterized by part-time, temporary or fixed-term employment, earn less than their "permanent" colleagues, do not receive social guarantees and, as a rule, do not have a severance package. Long-term obligations are also reduced or absent, since, for example, temporary employment relationships mean that employers are not required to pay pensions or provide long-term benefits.
Flexibility of personnel	Precarious labor relations increase the flexibility of the workforce and enable employers to respond quickly to market changes. Under standard employment relations, it is more difficult to move, hire, or release personnel.
Ability to satisfy the demand	Increasing demand often leads to the need for additional resources. In this case, there are fewer barriers to hiring temporary labor that can allow organizations to meet this demand.
Attraction of employees	Some employees, especially those who can expect a market premium for having unique skills, are not interested in long-term cooperation. In addition, individuals simply prefer the flexibility that is achieved in temporary employment relationships.
Definition of resources	Hiring an employee on a temporary basis is an effective way to reduce the risk associated with the selection of permanent staff. In this case, if the employee meets the requirements, they may be provided with more favorable conditions.
Expected risks	
Higher staff turnover	Hiring temporary workers increases the risk of staff turnover because they are more likely to quit. This can lead to increased costs for career guidance and training.
Reduced activity and consistency of actions	Employees under precarious employment work less than full-time employees and are less likely to invest more time and effort in fulfilling their responsibilities. In addition, the activities of these employees are less aligned with the goals of the organization, which reduces the return on investment in personnel.
Reduced performance	As a rule, employees involved in stable labor relations have a higher level of professional skills and knowledge compared to those under the precarious employment scheme, whose work is less productive, which reduces the overall performance of the organization.
Health and safety risks	Employees under precarious employment relationships create additional health and safety risks to the organization because they do not have the same knowledge and experience as their full-time colleagues.
Decline in customer satisfaction	Poor customer engagement can have significant negative consequences; as a result, some employers believe that having non-permanent employees in positions, especially those related to work in the service sector, is an unacceptable risk.
Source: Precarious employment employer's perspective: report. KPMG. Available at: https://pepso.ca/documents/kpmg-uw-report-precarious-employment-may-2014.pdf	

same time there are certain risks that, in the opinion of employers, outweigh the benefits [56, p. 8]. Let us consider the main ones.

Labor productivity. Precarious employment is closely related to motivation and productivity. At the same time, employees feel less satisfied with the work they have performed; their motivation and labor activity decrease [57, 58]. A fairly large number of publications show that in the companies that use less stable forms of labor relations labor productivity declines [59, 60]. However, according to a different point of view, employees who are afraid of the risk of dismissal can start working more intensively to increase their value to the organization [61]. However, research shows that the creativity and ability of an individual to solve problems are reduced if their work has signs of instability [62].

Staff turnover. Social insecurity, lack of certainty and other negative characteristics of unstable labor relations can have a decisive impact on the desire to continue working for the company; it is manifested in a high level of staff turnover [63, p. 43]. In this case, there is a risk of loss of qualified employees who can find a more decent job, the risk of the employer's costs for finding and training new employees, and the risk of a general change in personnel policy. At the same time, if signs of precarious employment affect the majority of jobs, this may lead to a gradual loss of specific corporate skills acquired during work in the company, which may limit the ability of the latter to respond to market changes [64, p. 6].

Risks to the health and safety of employees. As mentioned above, precarization of employment has a significant negative impact on the health and safety of employees. Moreover, the employer runs the risk of facing problems of occupational injuries and occupational diseases, as well as the need to cover losses due to the absence of an employee at work and payment

of compensation for temporary disability. In addition, the inconvenient work schedule associated with the need to return home in the evening and night hours is accompanied by security problems, especially for women [65, p. 85].

Implications of employment precarization: social level

Processes occurring at the individual and organizational levels are interrelated and can have an impact on the life of society as a whole. According to an ILO report published on the results the Workers' Symposium on Policies and Regulations to combat Precarious Employment, which took place in 2011, the impact of precarization of labor relations on society is most discouraging[5]. This is manifested in many disorienting and divisive practices.

Labor market. Employment precarization processes directly affect the functioning of the labor market. For example, the popularity of temporary contracts in times of economic crisis may result in their use on a systematic basis, which will lead to even greater economic uncertainty, since the costs of the firm associated with the dismissal of full-time employees, and its flexibility with respect to personnel policy only reinforce each other[6]. At the same time, the coexistence of standard and non-standard jobs can contribute to further segmentation of the labor market, when workers in one sector have favorable working conditions and job security, and in the other — face uncertainty and social vulnerability (even when performing the same types of work). It is also known that involvement in

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[5] From precarious work to decent work. Outcome Document to the Workers' Symposium on Policies and Regulations to combat Precarious Employment. ILO. Available at: https://www.ilo.org/wcmsp5/groups/public/---ed_dialogue/---actrav/documents/meetingdocument/wcms_179787.pdf

[6] Non-standard employment around the world: Understanding challenges, shaping prospects. ILO. Available at: http://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_534326.pdf

precarious labor relations reduces the chances of permanent employment, which leads to an increase in unemployment and employment in the secondary labor market [66, p. 4].

Public participation. There is a lower level of social cohesion and neighborhood participation among the precariously employed population. Studies show that precarization of labor relations has a negative impact on people's participation in social activities, in particular in volunteering [65]. There is also an opposite view, according to which individuals who, for example, are involved in part-time or temporary employment are more likely to participate in social activities. However, this is more typical for high-income households [18, pp. 121-123]. Employees exposed to instability in the workplace are less likely to be members of the trade union movement [18, p. 63], which significantly reduces the range of ways to protect their labor rights. Because of this situation, many employees do not feel confident enough to start defending their rights, and therefore are at risk of being fired. This in turn provokes a crisis of civic participation in the trade union movement. At the same time, it has been found that the transition from precarious to stable employment increases the intensity of social interactions by 13% and the probability of participation in elections by 20% [18, pp. 128-136]. In-depth interviews with precariously employed Canadians have shown that this type of work hinders cohesion and collective action: workers view each other as competitors for future jobs, which leads to a sense of isolation and alienation [67, p. 147].

Political stability. Social insecurity is always at the heart of any political force [68, p. 122]. Precarization processes (in the sphere of employment as well) undermine the social foundations necessary for building a democratic society, giving priority to individual

responsibility [69]. Vulnerability in its various forms is the cause of discontent and social conflict. RAS Corresponding Member Zh.T. Toshchenko emphasizes that this resentment is the reaction of unsettled people rather than poor people; the unsettled hope for a fair solution to the existing problems [70, p. 245]. In general, as G. Standing points out, the uncertainty of the situation can make workers more susceptible to the formation of radical views [10]. Employees stop demanding something from a specific management and turn to the authorities. For example, the EuroMayDay movement, which has become an expression of protest against the growth of unprotected employment, appeals to governments to improve working conditions [10, pp. 1-3]. At the same time, research carried out by the Federal Research Sociological Center of the Russian Academy of Sciences of the Russian Academy of Sciences shows a decrease in interest in politics among people exposed to instability in the workplace (in 2003, the lack of interest in politics was expressed by 36% of respondents, in 2013 – by 63%) [70, p. 235].

Social inequality and exclusion. The unstable nature of employment and its manifestations often lead to an increase in social inequality (both general inequality and in the context of individual components: material, educational, housing, etc.), exclusion from the social security system and from society as a whole. Social exclusion may result from the threat of reduced financial independence and social insecurity. In this case, the primary consequence is income inequality, which gives rise to other types of inequality. For example, research shows that the widespread use of temporary employment contributes to the aggravation of wage inequality in OECD countries and Latin America [71]. An unstable financial situation can lead to inequality in access to various goods and services, and to certain changes in

consumption patterns. For example, temporary workers and crowdworkers face significant difficulties in obtaining a housing loan [72]. The generalizing result of these processes can be the transformation of the social structure of society and the formation of a new class – the precariat [10, 70].

Socio-economic development. As we have mentioned above, employment precarization has a negative impact on labor productivity; such a situation directly affects economic development indicators. This may be reflected in the growth of shadow employment and "gray" wages, and in the decrease in tax and insurance premiums [73]. According to the findings of a research on the materials of individual entities of the Northwestern Federal District, the spread of unstable employment leads to losses from underutilization of human capital in the amount of 1% (Kaliningrad Oblast) to 7% (Republic of Karelia) of GRP [74, p. 286]. Along with this, the pace of innovation is decreasing [75]. Due to the fact that in conditions of precarious employment, individuals tend to postpone the birth of children, this can negatively affect the birth rate among the population as a whole. Similar conclusions were reached by scientists who analyzed the situation on the labor market in Italy and Spain [76]. The lack of guarantees for sick pay and the lack of access to quality healthcare can also have a significant impact on public health; besides, limited opportunities for professional development hinder the accumulation of human capital.

Conclusion

Thus, our analysis has shown a truly multifaceted nature of the implications of employment precarization manifested at the individual, organizational and social levels. We have tried to take into account this fact in our classification of these implications *(Figure)*. Since the phenomenon under consideration is the object of close attention of scientists from various fields of knowledge, we can assume that the list of negative effects caused by it will only expand. In the framework of this study, we tried to focus on the representation of how the process of destabilization of labor relations goes beyond the working life of employees and extends to society as a whole, creating threats to the stability of the socio-economic situation of territories. Against the background of the rapid development of non-standard forms of employment, these issues are seen as particularly relevant and require detailed study in relation to specific environmental conditions, since cross-country features can have a serious impact on the functioning of the social and labor sphere.

At the same time, the scale of the implications of the process of employment precarization dictates the need to improve the theoretical and methodological foundations of its research. At present, there is a situation where the same concepts are often interpreted quite differently. Therefore, the introduction of conceptual and terminological clarity in this area should be the starting point for the formation of a complete picture that reflects the essence of employment precarization and its manifestations at various levels of the organization of society, which will serve as the basis for the development of appropriate methodological tools.

Our research contributes to the development of ideas about the possible effects of employment precarization in the context of the theoretical and methodological pluralism prevailing in the scientific literature. Scientific novelty of our research lies in the fact that our classification of the implications of the phenomenon under consideration by the levels of society organization clearly reflects the risks for various subjects of social and labor relations. The results we have obtained can provoke a

Classification of implications of employment precarization according to the level of organization of the society

Socio-economic implications of employment precarization	
Social level	*Violation of the functioning of the labor market.* Precarization of employment contributes to increasing uncertainty about the situation in the labor market, which can provoke, for example, an increase in its segmentation and a growth of unemployment. *Decline in social cohesion and the refusal of the population to participate in public life.* Precarization of employment can lead to an increase in the atomization of society, since the uncertainty of working life negatively affects social interaction and creates isolation and alienation. *Destabilization of the political situation.* The instability of employment is the cause of discontent and social conflicts, which in the absence of an effective dialogue with the employer not only become a political agenda, but also make employees more susceptible to radical moods. *Aggravation of social inequality and an increase in social exclusion.* The spread of precarious employment produces a transformation of the social structure of society, resulting in the formation of a new class – the precariat that has limited access to various goods and services. *Slowing down the pace of socio-economic development.* The multiplicity of negative implications of employment precarization ultimately has a destructive impact on the socio-economic development of territories.
Organizational level	*Decrease in labor productivity.* Destabilization of labor relations usually results in a decrease in labor productivity, as employees become less interested in the results of their work. *Increase in staff turnover.* The use of less stable forms of employment may encourage employees to find other jobs, which will increase the costs of hiring/firing employees and the risks of losing specific corporate skills. *Increased risks related to the health and safety of employees.* The negative impact of employment precarization on the health of employees creates prerequisites for increasing staff costs.
Individual level	*Deterioration of material well-being and social security.* Precarization of employment has a negative impact on employees' incomes and, as a rule, leads to the loss of social guarantees, which in total affects people's well-being. *Deterioration of health status.* Adverse working conditions as one of the characteristic manifestations of precarization of employment cause serious harm to the physical and mental health of employees. *Uncertainty of personal and family future.* The lack of job security in case of destabilization of labor relations prevents the formation and implementation of life plans. *Limitation of opportunities for professional development and professional experience.* Precarious employment significantly narrows the professional prospects of employees; as a result, they are forced to work in the current conditions.

Source: own compilation.

substantive discussion of the relevance of these implications for Russia; because, despite the close attention of domestic scientists to the topic of employment precarization, specific empirical studies are extremely rare. All this helps better understand the prospects for the development of social and labor relations in the perspective of global challenges and threats. However, it is already possible to speak with confidence about the need to create legal conditions for the introduction of more flexible forms of employment and expanding the use of non-standard employment contracts, which will require bringing Russian labor legislation in line with the challenges of our time. In addition, we should note the importance of improving public policy aimed at implementing real actions to create high-performance jobs, consistent legalization of the informal sector of the economy, modernization of employment

services, etc. Otherwise, we may face further destabilization of labor relations, which will bring into question the possibility of ensuring not only decent working conditions, but also the sustainability of the socio-economic development of the country as a whole.

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Foreign Migrants in the Russian Labor Market: the Estimate of Their Overall Number and Their Contribution to Russia's GDP*

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Abstract. Nowadays Russian Federation is one of the world leaders according to the number of international labor migrants it receives. Russia is among the top ten countries according to the volume of remittances from foreign workers to their countries of origin. However, it is impossible to provide an exact statistical estimate for the total number of foreign citizens working in the Russian labor market since there continue to exist certain legal regimes within the post-Soviet area concerning entry into Russia and staying there. The present research analyzes a methodology for an indirect estimate of the overall number of foreign workers in the Russian labor market. The methodology is based on the data on money transfers to migrants' countries of origin, on the estimate of their income in Russia and on the structure of their usage. The research reveals that according to the "medium scenario" in 2017 there were about 7.2 million foreigners working in Russia, and only 2.9 million of them worked legally. The following conclusion can be made: about 60% of foreign workers in Russia are not included in the data of the Federal State Statistics Service of Russia and the General Administration for Migration Issues under the Ministry of Internal Affairs of the Russian Federation. The estimate of the foreign workers' contribution to Russian GDP is based on the overall number of foreign labor migrants in Russia. According to our estimate, their contribution was around 6.4% in 2017.

Key words: international migration, labor migration, irregular migration, labor migrants, remittances.

Introduction

From the second half of the 20th century, processes of globalization, together with growing cross-country socio-economic differentiation, contributed to sharp intensification of population's migration flows and led to the formation of a new migration situation in the world. Currently, there are more than 258 million migrants [1, p.4]. Moreover, hundreds of millions of people get involved in different forms of interstate movements (permanent and temporary) annually [2]. Foreign migrant workers have become an objective phenomenon in the labor market of developed countries, and emigration has become one of the main ways of improving the level of well-being in developing countries. International Labor Organization estimates that the number of migrant workers is about 164 million [3, p. 6]. According to World Bank data, in 2017, migrants transferred more than 466 billion US dollars to developing countries, which is three times more than receipts through official channels. At the same time, the total amount of migrant remittances exceeded 613 billion US dollars [4, p. 4].

Russia is a classic example of a country that is a major recipient of international labor migrants, and one of the centers of attraction for the labor force within the Eurasian migration system. It is extremely difficult to quantify the total number of foreign citizens engaged in (legal and illegal) employment system of our country. Thus, General Administration for Migration Issues of the Ministry of Internal Affairs of Russian Federation assessed that 1 million 682.6 thousand patents and 148.3 thousand work permits were issued to foreign citizens in 2018[1].

The main labor donors for the Russian labor market are the CIS republics (Kyrgyzstan, Moldova, Tajikistan, Ukraine, and Uzbekistan), from which Russia receives mainly labor resources with a low level of human capital development. Only 27 thousand qualified specialists, who had a valid work permit, were

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[1] Official webpage of General Administration for Migration Issues of the Ministry of Internal Affairs of Russian Federation. Available at: https://xn--b1aew.xn--p1ai/Deljatelnost/statistics/migracionnaya/item/15850787/. Accessed: 20.04.2019.

among more than seven million people, who came to the country for work: it is less than 0.4% of the total migration flow[2].

Labor migration flows form a number of "counter-flows" into countries – donors of labor force. In addition to return labor migration and the flow of information, which is an important factor in the formation of migration processes, financial flow has a great significance. Thus, according to The Central Bank of the Russian Federation, the volume of money transfers to the CIS countries in 2017-2018 was more than 13 billion US dollars[3].

Methodology of the research

Currently, there are no "direct" statistical instruments for assessing the total number of foreign employees (legal and illegal) in the Russian labor market. Available numbers are of estimated nature due to the significant illegal component of international labor migration.

Methods of estimating the number of illegal labor migrants are similar to methods of evaluating other "informal" socio-economic processes and have the same methodological problems. The main issue is that it is, by definition, impossible to account all "undocumented" migrants [5; 6; 7].

In general, all methods of estimating the number of illegal migrants are ultimately based on the use of available statistical data and the analysis of registered cases of illegal migration. On the basis of observed and recorded indicators, in turn, it is possible to draw a

conclusion on the scale of "unobservable" phenomena (total number of illegal migrants, number of illegal migrant workers, etc.) [6; 7; 8; 9].

This study proposes a methodology for estimating the total number of foreign migrant workers in the Russian labor market based on the analysis of remittances sent by migrants to their home countries and evaluation of the contribution of labor migrants to the gross domestic product of Russia.

Sources of statistical data were data of the Central Bank of the Russian Federation on remittances of labor migrants to their home countries, data from the Russian Federal State Statistics Service on average wages in the labor market and national GDP, and data from sociological studies on wages and productivity of labor migrants.

Remittances of migrant workers from Russia

One of the main goals of international labor migrants is the sending of money (transfers) to their home countries. According to the Central Bank, more than 17 billion US dollars were transferred by foreign labor migrants from Russia in 2017−2018. This statistical data clearly show that the decline of cash flows, observed in 2015−2016, was replaced by an increase in 2017. Moreover, in the ruble equivalent, the volume of transfers in 2017 exceeded the 2014 indicator (*Tab. 1*). We can say that certain sectors of the Russian economy, which use migrants' labor, begin to overcome the crisis phenomena of the Russian economy.

In 2018, about 14 billion US dollars were transferred to the CIS countries. In the post-Soviet space, the largest financial flows from Russia were directed to Uzbekistan (3.69 billion US dollars), Tajikistan (2.62 billion dollars), and Kyrgyzstan (2.23 billion dollars). About 4.7 billion US dollars were transferred to distant foreign countries.

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[2] Official webpage of General Administration for Migration Issues of the Ministry of Internal Affairs of Russian Federation. Available at: https://xn--b1aew.xn--p1ai/Deljatelnost/statistics/migracionnaya/item/12162186/ accessed: 20.04.2019. Population size and migration in the Russian Federation in 2017. Moscow: Rosstat, 2018. Available at: http://www.gks.ru/bgd/regl/b18_107/Main.htm. Accessed: 20.04.2019.

[3] Official webpage of The Central Bank of the Russian Federation. Available at: http://www.cbr.ru/vfs/statistics/CrossBorder/Personal_Remittances_CIS.xlsx. Accessed: 20.04.2019.

Table 1. Remittances of foreign employees to their home countries

Indicator	2013	2014	2015	2016	2017	2018
Remittances of migrants to their home countries, bil. US dollars	30.4	27.0	16.3	14.2	17.9	18.8
In % to the previous year	120%	89%	60%	87%	126%	105%
Remittances of migrants to their home countries, bil. rub.	968.4	1038.0	994.5	948.6	1043.1	1178.6
In % to the previous year	123%	107%	96%	95%	110%	113%
According to: data of The Central Bank of the Russian Federation.						

Figure 1. Countries-leaders in migrants' remittances to home countries, billion US dollars, 2017
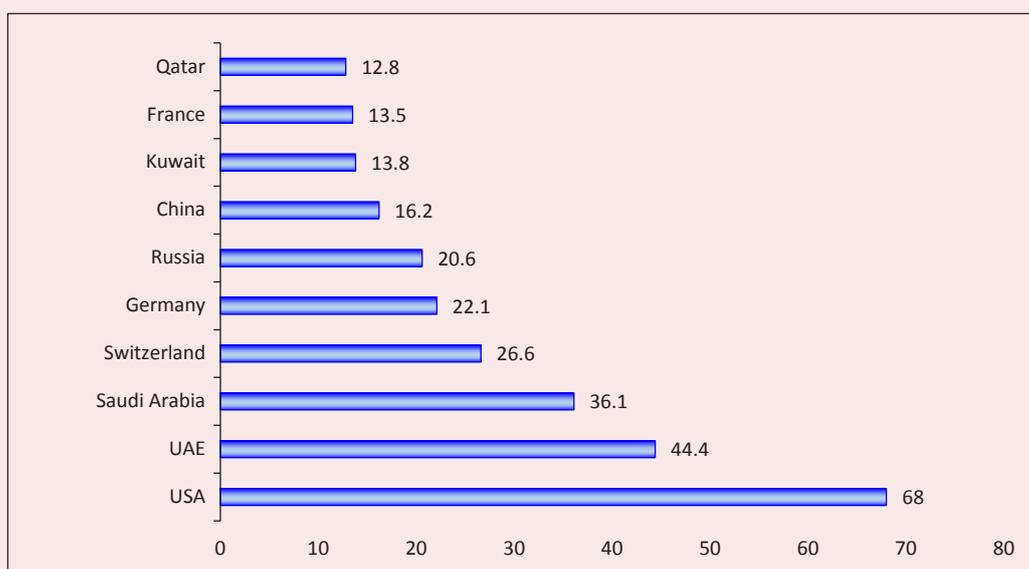
Source: data of The Central Bank of the Russian Federation [10].

According to the World Bank, Russia holds the leading position in the world in terms of the total volume of transfers sent, being the 6th in late 2017 (*Fig. 1*).

At the same time, if the exchange rate of the Russian ruble to the US dollar remained at the level of 2013 (the weighted average rate from 01.01.2013 to 31.12.2013 was 31.8 rubles per US dollar), Russia would occupy the 3rd position in the list with 40.5 billion dollar indicator. At the same time, the highest value of money transfers from Russia happened in 2013, when the total volume of money transfers exceeded 37.2 billion US dollars.

Payment to foreign employees in Russia

The specifics of Russian foreign workers accounting and the form of their employment do not allow obtaining data concerning migrants' average salary. The patent system and gray, illegal forms of employment make this task impossible for direct statistical methods. For the purposes of this study, it is necessary to use data from sociological studies: especially surveys of migrant workers.

To calculate the total number of foreign workers employed in the Russian labor market, let us refer to the data on salaries obtained during the study conducted by the Center of

Table 2. Comparison of average salaries of Russian and foreign employees

Indicator	2012	2013	2014	2015	2016	2017
Average monthly nominal accrued salary of Russian employees*, rub.	26629	29792	32495	34030	36709	39167
Average salary of foreign employees**, rub.	19766	21833	23900	25966	28032	30100
Ratio of average salaries of Russian and foreign employees**, %	74.2	73.3	73.5	76.3	76.4	76.9
* According to Rosstat data. ** Own calculations according to research data of Center for Ethnopolitical and Regional Studies.						

Ethnopolitical and Regional Studies for HSE University. According to it, an average salary of a migrant worker in Russia was 30.1 thousand rubles in 2017: it is 76.9% of the average salary of a Russian citizen.

As we can see (*Tab. 2*), the gap between wage levels of migrants and Russians was about 25% in 2012−2017. However, since 2015, there has been a tendency toward gradual reduction of this gap.

Using Rosstat data on the number of foreign workers, it is possible to calculate an approxi-mate total annual salary of migrant workers in Russia. As we see in *Table 3*, it has significantly increased over the past 5 years. At the same time, in 2016, this figure was higher than the total amount of money transfers by 4835.9 million rubles. In other words, remittances accounted for 99.5% of the annual salary of foreign workers. At the same time, a certain part of money transfers passes through informal networks and is not taken into account by the Central Bank of Russia. We can conclude that a significant number of migrant workers are not considered by the Russian State Statistical System.

Even if we take into account the fact that the proposed approach includes temporary labor migrants and foreigners, who have a temporary residence permit or a residence permit, it is possible to conclude that the actual number of foreign citizens, engaged in labor activity of the Russian Federation, is two times higher than the official data say.

Estimation of total number of foreign workers in Russia

The structure of migrant workers' wages spending usually consists of the following components: food expenses, rent, taxes, mandatory payments, and funds sent to families back home (money transfers) [11; 12; 13; 14].

Having information about the share of wages that migrants transfer to their home countries and the total amount of migrant workers' remittances, it is possible to estimate the total number of foreign workers, including the illegal component.

Table 3. Ratio of total salaries of migrant workers to total amount of migrants' money transfers to home countries

Indicator	2012	2013	2014	2015	2016	2017
Total amount of annual salaries of migrants, million rub.	670067.4	780250.3	952835.6	1055517.9	953446.8	938608.2
Volume of migrant workers' remittances to home countries, million rub.	788394.1	968370.3	1038000.6	994467.2	948610.9	1043129.5
Balance, million rub.	−118326.7	−188120.0	−85165.0	61050.7	4835.9	-104521.3
Source: own calculations according to data of The Central Bank of the RF and Rosstat.						

According to several studies, temporarily resident foreigners spend significantly less of their income in the country of destination than local residents and migrants moving to permanent residence. In T. Bauer and M. Sinning's studies, it is said that, in 2000−2003 in Germany, the level of savings was 8.6% among local population, while it reached 11.8% among temporary migrants (including remittances to their home countries) [15, p. 10]. According to another M. Sinning's study, temporary migrants in Germany, on average, saved 24% more funds and transferred 21% more funds to their home countries than permanent migrants [13, p. 14].

According to a survey of temporary Mexican migrants in the United States, in the early 2000s, remittances to home countries of migrant workers were about 40% of their earnings. At the same time, a higher share of income transfers was observed among illegal migrants, people with low education levels and low English language proficiency [12, p. 57].

According to International Organization for Migration (Mission in Ukraine), Ukraine migrants spend abroad about 35% of earnings on their needs and put aside 35%. Average remittances of Ukrainian migrants to their home countries are about 30% of their monthly income [16, p. 57]. At the same time, according to research of The National Agency for Financial Studies and Western Union, labor migrants from CIS countries send home around 40% of their incomes in the Russian Federation [15].

Let us calculate the estimated number of foreign citizens who work in Russia, based on the share of earnings they transfer to their homeland.

We use three scenarios.

1. Scenario no. 1 ("high"): labor migrants send home 30% of their monthly income.

2. Scenario no. 2 ("medium"): labor migrants send home 40% of their income.

3. Scenario no. 3 ("low"): labor migrants send home 50% of their income

Based on data on volume of migrants' money transfers to homeland, *Table 4* presents assessments of total number of foreign workers in the Russian labor market in accordance with "high", "medium", and "low" scenarios.

Table 4. Estimation of total number of foreign employees in the Russian labor market

| Indicator	2012	2013	2014	2015	2016	2017
Volume of remittances of migrant workers to home countries, billion rub.	788.4	968.4	1038.0	994.5	948.6	1043.1
Total annual salaries of migrants in scenario no. 1, billion rub.	2628.0	3228.0	3460.0	3314.9	3162.1	3477.1
Total annual salaries of migrants in scenario no. 2, billion rub.	1971.0	2421.0	2595.1	2486.2	2371.5	2607.8
Total annual salaries of migrants in scenario no. 3, billion rub.	1576.8	1936.7	2076.0	1988.9	1897.2	2086.2
Number of foreign employees in scenario no. 1, million people	11.1	12.3	12.1	10.6	9.4	9.6
Number of foreign employees in scenario no. 2, million people	8.3	9.2	9.0	8.0	7.1	7.2
Number of foreign employees in scenario no 3, million people	6.6	7.4	7.2	6.4	5.6	5.8
Source: own calculations.						

If we use "medium scenario" as the main one (labor migrant sends home 40% of income, earned in the Russian Federation), we learn that, in 2017, estimated number of foreign workers in the Russian labor market was about 7.2 million people. Thus, in this scenario, it might be concluded that about 4.3 million foreign workers in Russia (almost 60%) were not revealed and not included in data of Federal State Statistics Service of Russia and General Administration for Migration Issues of the Ministry of Internal Affairs of the Russian Federation (*Fig. 2*). According to a study, conducted by the Center for Economic Strategy in 2018, only 38% of Ukrainian labor migrants work legally abroad. Thus, the share of illegal migrants among Ukrainian migrant workers is about 60% [17].

According to our estimates, the largest number of foreign labor migrants worked in Russia in 2013 (9.2 million people), while many of them (67%) did it illegally (6.2 million people). The sanctions pressure, which increased the crisis processes in the Russian economy, led to a decrease of the total number of foreign workers in the Russian labor market in 2014−2016. This process is shown in official statistics and our calculations. 2017 indicators showed growth for the first time since 2013, which might be an indirect indicator of improving macroeconomic situation in Russia.

It should be noted that the obtained number of illegal (undocumented) migrants is estimated. However, these calculations have instrumental significance, allowing us to estimate the total number of foreign workers in Russia and offer a new methodological approach to calculating the number of illegal migrants.

Figure 2. Dynamics of estimated total number of foreign workers in the Russian labor market
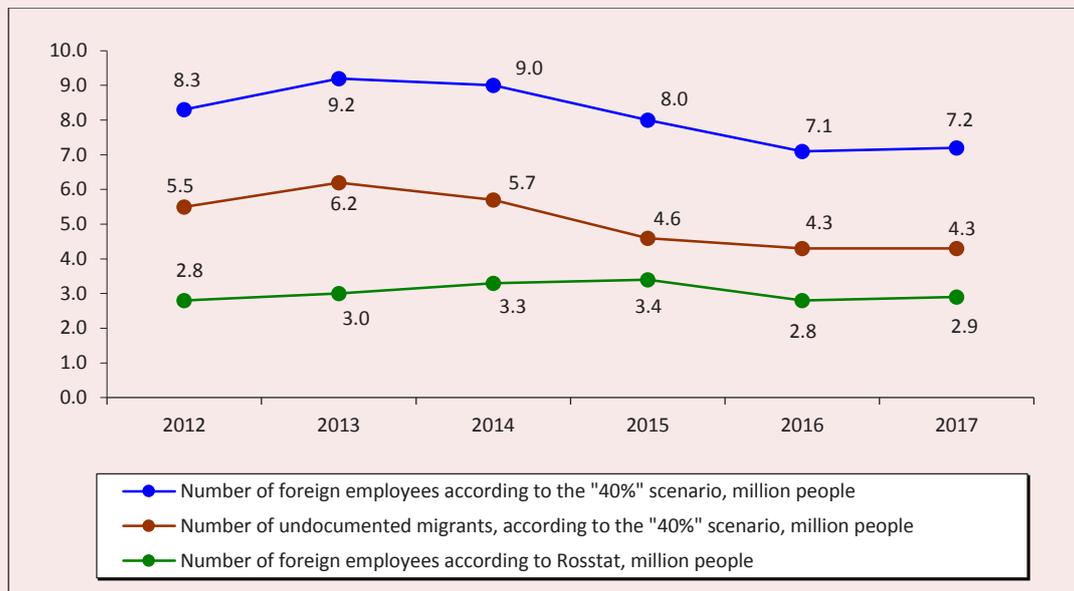
Source: own calculations.

Assessing the contribution of foreign workers to Russia's GDP

Assessment of labor migrants' contribution to Russia's GDP creation is a difficult task [18; 19]. First, there are no precise data on the number of migrant workers in the country. However, there are contradictions even in official statistics. For example, there are discrepancies between the number of migrants who entered Russia for work, according to The Border Service of the Federal Security Service of the Russian Federation, and the number of officially working in Russia labor migrants, according to Rosstat. Second, there is no statistical information on the employment structure of migrant workers in Russia. There are no official data on the number of migrants according to types of economic activity, which makes it impossible to assess the contribution of migrants to the development of certain branches of Russian industry. Third, the scarcity of statistical information does not allow us to accurately determine the level of labor productivity of foreign workers: to calculate the average level for all sectors of the Russian economy or to calculate indicators for certain types of economic activity [20; 21].

One of the most used methods of assessing contribution of foreign migrants into GDP of a host state is the evaluation through employment. However, while assessing the contribution of labor migrants to GDP creation, their share in the total number of employees is rough: it cannot serve as a correct assessment of such contribution. Usually, sectoral structures of foreign citizens and country's residents' employment do not coincide, and labor productivity, in turn, varies according to types of economic activity. Individual productivity of employees also differs within certain economic sectors: an indirect indicator of this is the level of education (duration of training) of the latter

[22, p.110]. On the basis of such approach, ILO experts conducted the following measurements for the U.S. economy in 2010. Given the fact that migrants amounted to 17.5% of U.S. labor force, their contribution to country's GDP creation, including the increased share of foreign workers employed in industries with relatively low productivity (agriculture and household services), was 15.8%, and 14.8% with considering lower level of foreign workers' education [23, p.31]. An indirect indicator of the productivity of foreign workers might also be a relative level of their potential wages (in comparison with the wages of country's citizens), not actually received, which, among other conditions, would correspond to the professional and qualification of foreign workers. According to ILO, in Europe, average monthly gross earnings of foreign workers were 17.5% lower than those of local employees. However, in this difference, only 6.2% could be explained by professional and qualification factors. Another 11.3% practically are not related to productivity and caused by discrimination, worse protection of visiting employees by collective agreements, etc. At the same time, according to the study, the explained (potential) gap in earnings in several countries (including Denmark, Sweden, Germany, and Poland) is even in favor of migrants [22, p. 110].

In Philipp Martin's study, who also uses the method of assessing contribution of migrants in Thailand's GDP through migrants' share in employment, it is pointed out that productivity of migrants might be around 50% from local populations' productivity [10].

As mentioned earlier, migrants' flow to the Russian Federation has the lowest indicators of human capital development. This is caused, on the one hand, by low level of development of the education systems in main labor donor countries, and, on the other hand, by high

Table 5. Estimation of the share of foreign workers in the total number
of employees in the Russian Federation

Indicator	2012	2013	2014	2015	2016	2017
Employed, thousand people	71545	71391	71539	72324	72393	72315.9
Foreign labor migrants, thousand people (research data)	8309.7	9240.3	9048.1	7979	7050.1	7219.8
Share of migrants in total number of employed (research data), %	10.4	11.5	11.2	9.9	8.9	9.1
Foreign labor migrants, thousand people (official data)	2825.0	2978.1	3322.3	3387.5	2834.4	2910.3
Share of migrants in total number of employed (official data), %	3.8	4.0	4.4	4.5	3.7	3.9
Source: own calculations.						

demand for low-skilled labor in the Russian economy. Thus, just like in the United States and the European Union, the productivity of foreign workers in the Russian labor market, on average, will be lower than productivity of Russian citizens [20].

This research contains assessment of foreign workers' contribution in the creation of Russian GDP. It is based on our previously evaluated data on total number of foreign workers in the Russian labor market. Moreover, this study presents comparison of assessments, taken from own calculations, with official assessments of the number of foreign migrants in Russia (*Tab. 5*).

According to this data, based on our calculations and given in the table, the share of foreign workers in the Russian labor market was 9% in 2017. The highest share of employed migrants in Russia was in 2013: the number at that period was 11%. In turn, according to official data, in 2017, the share of foreigners in the total number of employed people in Russia was less than 4%.

Figure 3. Assessment of foreign workers' contribution to Russian GDP
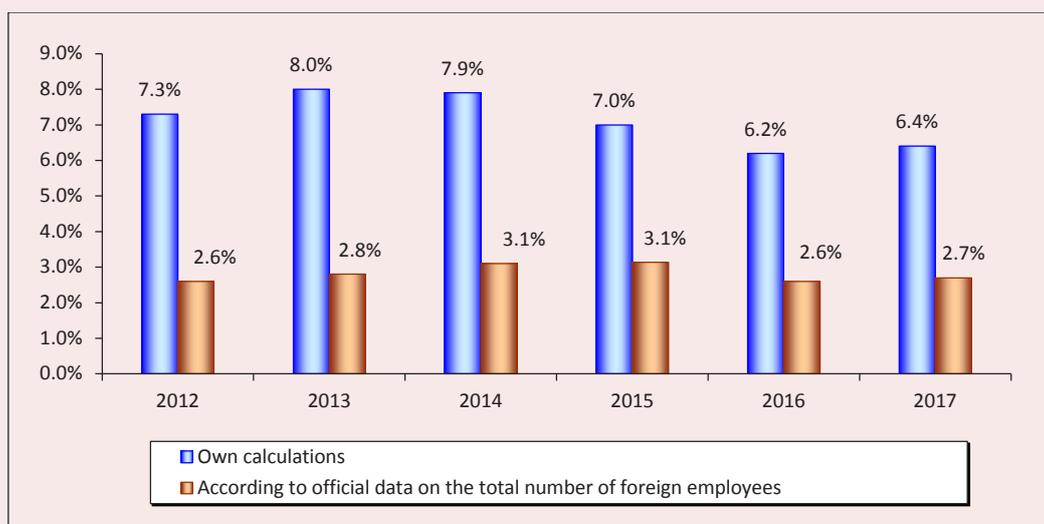
Source: own calculations.

Based on our assessment of total number of foreign workers in Russia and official data of Federal State Statistics Service, we conducted an estimation of migrants' contribution into the creation of Russian GDP (*Fig. 3*). Continuing ILO approach, proposed for the U.S. [23], and considering low development indicators of human capital of incoming labor migration flow, let us correct labor productivity of foreign workers on the level of 70% from the average labor productivity level in Russian economy.

The results clearly demonstrate a significant discrepancy between the calculations based on our research data and those based on official information concerning the number of foreign workers in Russia. According to our calculations, the total contribution of foreign labor migrants amounted to 6.4% of GDP in 2017, which is about 5.9 trillion rubles (101 billion US dollars) in absolute terms. At the same time, the maximum contribution of migrants to GDP was fixed in 2013. It was about 8% of GDP, which amounted to 5.9 trillion rubles (184 billion US dollars) in absolute terms.

Conclusions

1. The study showed that official statistics significantly underestimate the total number of foreign citizens who work in Russia. In this regard, the assessment of the contribution of labor migrants to the creation of Russia's GDP, made on the basis of official data does not capture the real situation.

2. The methodological approach, used in this paper, allowed us to estimate the number of illegal labor migrants in Russia and the total number of foreign workers in the Russian labor market. On the basis of the "medium" scenario (a migrant worker sends home 40% of his earnings), we calculated that, in 2017, the number of foreign workers in the Russian labor market was about 7.2 million. Almost 4.3 million of them were not statistically revealed and were not included in data of the Federal State Statistics Service and General Administration for Migration Issues of the MIA RF.

3. In the course of this study, it was found that the share of foreign workers in the total number of employed people in Russia is about 9%, which is 2.3 times higher than the estimates of the Federal State Statistics Service. At the same time, the maximum value of this indicator was reached in 2013 (11.5%).

4. According to our estimates, the total contribution of foreign workers to Russia's GDP was 6.4% in 2017, which is 5.9 trillion rubles (101 billion US dollars) in absolute terms. It is 2.4 times higher than assessments made on the basis of official data from Rosstat. At the same time, the maximum contribution of migrants to Russia's GDP was also noted in 2013. It amounted to 8% of GDP, which, in absolute terms, was 5.9 trillion rubles (184 billion US dollars).

5. The positive dynamics of indicators, such as remittances of migrants to their home countries (in rubles and dollars), the share of foreign labor migrants in the Russian labor market, and the contribution of labor migrants to Russian GDP, clearly show that the demand for foreign labor in Russia begins to grow. Thus, our research allows us to conclude that there is revitalization in several Russian economy's sectors, which actively use foreign labor.

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Current State and Prospects of Family Policy in Russia: Socio-Demographic Analysis

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Abstract. The goal of the work is to analyze the measures and expected results of the state family policy, including the activities of the national project "Demography" (2018), affecting the interests of the family, which allows us to determine the prospects of family policy. The article is based on the analysis of state documents on the strategy of demographic and family policy, official statistics, population censuses and sample surveys of Rosstat. We identify the effectiveness of family policy measures taking into account the differentiation of socio-demographic development of regions. To do this, we use methods of descriptive statistics and multidimensional data analysis — dispersion and cluster analysis. The cluster analysis makes it possible to form typological groups of regions depending on the dynamics of fertility, poverty level and the development of the preschool care system — the most important indicators characterizing the implementation of family policy strategy. Economic support measures, the effectiveness of which has been proven in a number of studies conducted in countries around the world, are very important for Russian families. However, the impact of these measures has its own specific features in connection with the differentiation of economic development of regions, opportunities for the development of social infrastructure, and maintenance of a decent standard of living for families with children; it is important to take all this into account in the development of family policy. The analysis of the effectiveness of family policy suggests the need to change the structure of implemented measures. Family policy should be long-term and systemic; it should be aimed at creating conditions that increase the independence of the family in modern society and economic relations. Often, in the course of formation of a strategy for activities in the field of family policy, there is no clear link between the goals of activities and indicators of its achievement. Complex issues that need to be addressed in the interests of the family (for example, providing opportunities for parents to combine family and professional roles) and that need to unite the efforts of various actors, including employers, remain outside the focus of family policy. The intersection of activities and expected results does not allow us to assess the effectiveness of individual strategic documents in the field of family policy.

Key words: the institution of the family, family policy, birth rate, demographic policy, effectiveness of family policy, national project "Demography".

Introduction

Socio-demographic policy in Russia is one of primary elements of the country's economic development strategy. Primary goal of population's reproduction governance is country's provision with necessary labor resources. Important forms of social life depend on it: economy, life quality of various social classes, country's defense capacity. In achieving the goal of required population growth at the expense of the birth rate growth, tools and measures of demographic policy intersect with family policy's set of instruments, aimed at supporting life of the family institution and implementing its basic, including reproductive, functions. Therefore, it is difficult to divide measures of demographic and family policy in many situations of government policy. It is especially critical for solutions aimed at strengthening of marital relations and intergenerational connections. The actualization of the process of introducing measures, which were recently formally included in program documents of Russian demographic policy, into social practice in Russia, in fact, affects the sphere of institutional support of the family — family policy.

Awareness of the family institution's role in the society's life has significantly influenced the creation of new family policy's strategy, taking into account the ongoing changes of Russia's socio-political and economic spheres. It also caused the search for the most reasonable methods of evaluating its effectiveness.

Concept of State Family Policy until 2025[1] was an important step of state family policy development. It continued the policy of providing systemic support to families, especially families with children, which began with the "maternity capital" program in 2007: when a second, third or a subsequent child is born or adopted, the family is given the opportunity to receive a significant sum of money (in 2017 − 453 thousand rubles) for purposeful usage (mother's pension, children's education, house purchase)[2]. Previous strategic documents on family policy's implementation, adopted in Russia at the end of the 20th century[3], were focused on the specifics of the family situation in the conditions of socio-economic and political crisis and did not take into account long-term trends in the family institution's transformation.

There is a clear correlation between Concept of Family Policy, adopted in 2014, Concept of Demographic Policy in the Russian Federation until 2025[4], Concept of Long-term Economic Development of the Russian Federation until 2020[5] in relation to objectives, areas, and expected results within family support. Program documents, adopted later ("National Action Strategy for Women"[6], "Decade of Childhood 2018−2027"[7]) are also heavily connected with Concept of State Family Policy in Activity Areas. Among the problems, related to the functioning of a family, first of all, attention is paid to decreasing number of children in families, increase of childless families' number, and reduction of stability in family relations. Expected results are an increase of general and total fertility coefficients, decrease of divorces. Among the measures aimed at increasing birth rates, there are plans for the development of a system of pre-school education and supervision, the provision, if necessary, of retraining and employment for women, who start working after maternity leave.

In accordance with the President's Decree no. 204 "On National Goals and Strategic Objectives of the Russian Federation through to 2024", dated May 7, 2018, the National project "Demography" was developed. It could be seen as the next step in the process of advancing initiatives from previously adopted demographic development and family support's programs. This project implies the achievement of the following objectives: to raise Russians' healthy life expectancy to 67 years, to boost total birth rate to 1.7 children per 1 woman, and to increase the number of people who lead a healthy lifestyle. National "Demography"

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[1] On the approval of Concept of State Family Policy in Russian Federation until 2025: Decree of the RF Government no. 1618-p., dated August 25, 2014.

[2] On additional measures of state support for families with children: Federal Law no. 256-FL, dated December 29, 2006.

[3] Concept of State Family Policy − 1993; Main areas of state family policy: Decree of the RF President no. 712, dated May 14, 1996.

[4] On the approval of Concept of Demographic Policy in the Russian Federation until 2025: Decree of the RF President no. 1351, dated October 9, 2007. Available at: http://www.consultant.ru/document/cons_doc_LAW_165069/

[5] On Concept of Long-term Economic Development of the Russian Federation until 2020: Decree of the RF Government no. 1662-p, dated November 17, 2008. Available at: http://www.consultant.ru/document/cons_doc_LAW_90601/

[6] On approval of National Action Strategy for Women for 2017−2022: Decree of the RF Government no. 410-p, dated March 8, 2017.

[7] On the declaration of the Decade of Childhood in the Russian Federation: Decree of the RF President no. 240, dated May 29, 2017.

project will be implemented in five areas, two of which directly affect families' lives: "Financial support for families after the birth of a child" and "Promotion of employment opportunities for women – creation of pre-school education available to children up to three years of age". It is assumed that such activities will let boosting total birth coefficient to 1.7 children until 2024.

The increase of the birth rate is expected to be achieved by old measures, which have been active in Russia for several years, and the ones recently included in state strategic document.

Thus, the project will continue the program of so-called "maternity capital". Besides, monthly payments to families in need (low-income) who gave birth (adopted) to a child, the provision of mortgage loans on preferential terms (6% of annual percent) to families with two or more children, payments after giving birth to a third child or subsequent children (until a child is 3 years old) remain relevant.

It is planned to increase the scope of activities aimed at retraining and improving the skills of women during the maternal leave with a child under three years old, creating of additional places in kindergartens and nurseries for children under three years old in state and non-state sectors of pre-school education.

The project's innovations include the increased number of extracorporal fertilizations (up to 450 thousand per year) at the expense of basic program of mandatory medical insurance. It should affect the growth of fertility and reduce the number of childless couples. Special attention is given to informational aspect: creation of TV-programs, Internet-content, published periodicals implementing programs aimed at propaganda of family values, support of motherhood and childhood. As previously noted, proposed measures significantly affect not only the regulation of demographic processes and reproduction but also the functioning of the family institution.

The goal of this work is the analysis of expected results of the National "Demography" project implementation within proposed measures related to families' interests. It will let us draw certain conclusions about possible effectiveness of the National project in relation to the family institution's support taking into account already implemented measures and significant regional differentiation of demographic processes and models of family life. Primary subjects of the analysis are measures that fall within the competence of family and demographic policy.

The search for the most efficient models of family policy is the subject of research in many countries of the world: Russia is not an exception. Implementation of the National project "Demography" will heavily define the nature of family policy in the following years: at least, in the context of supporting the reproductive, educational, and self-preservation family functions.

Thus, it is essential to evaluate the approaches used in the project in order to achieve the effect of family policy. The authors focus on the effectiveness of family policy measures implemented after 2008 – during the period of family policy activation in Russia, the implementation of the Concept of state family policy. This allows us to identify how innovative, in relation to the implemented family policy strategy, the national project is, and why earlier measures were not enough.

The examination of the National project "Demography" structure raises several research issues. What is the logic of forming a system of indicators and their quantitative values? How objectively will proposed indicators reflect the results of the project, if there is an intersection of activity areas with other program documents of family and demographic policy and the necessity to take into account Russian families' needs? Is it possible to evaluate the

effectiveness of implemented policies and individual programs on the basis of approved performance indicators, and how effective is it? How receptive are families to implemented policy measures? What are the prospects of the effectiveness of this National project?

If we speak about evaluating the effectiveness of family policy, it is necessary to take into account the fact that a Russian family model is very mosaic. The main indicators of its demographic and social development, which are reflected as expected results in strategic documents of family policy, are differentiated by country's regions. Accordingly, implemented measures are very different in terms of effectiveness. It should be taken into account in the process of developing regional family policy strategies and its effectiveness' evaluation.

The scientific novelty of the work is the review of indicators of the effectiveness of a number of Russian family policy program documents. They were adopted in recent years and allow us to get an idea about certain aspects of a family situation in country's regions. An objective assessment of family policy effectiveness is possible only in a system. The analysis of the effectiveness of individual measures of various policy documents leads to process' excessive formalization and does not provide a reliable picture. The use of statistical analysis methods allowed us to identify the alignment of birth rates, despite existing regional differentiation of family models and family policy in Russia. Also, it let us include the need to address issues of families' economic independence and the formation of a "family—work" balance (along with measures provided by the national project) in the discourse on the prospects of family policy effectiveness. The authors believe that it is impossible to talk about achieving the birth rate targets of the national project "Demography" without implementing

these measures in various Russian regions. At the same time, low living standards of families with children make them susceptible to economic support measures, the size of which is still insufficient.

Methodology of the research

The article is based on the analysis of state documents, devoted to the strategy of family and demographic policy, data of All-Russia population censuses (2002 и 2010[8]), micro-census of 2015[9], official statistics[10] and selective Rosstat studies: in particular, the Complex study of population's living conditions[11] (conducted in 2016, the sample population was 134,852 thousand people, data are representative for all Russian regions), Selective observation of population's reproductive plans[12] (conducted in 2017, sample population − 15 thousand households).

To identify the effectiveness of family policy measures and differentiation of socio-demographic development of regions, methods of descriptive statistics, as well as methods of multivariate statistical data analysis, in particular dispersive and cluster analysis, were used. The use of the cluster analysis method makes it possible to group the studied objects by several features at the same time. The method of cluster analysis allowed us to form typological

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[8] Data of 2002 All-Russia population census. Available at: http://www.perepis2002.ru/index.html?id=18; Data of 2010 All-Russia population census. Available at: http://www.gks.ru/free_doc/new_site/perepis2010/croc/perepis_itogi1612.htm

[9] Data of 2015 Russia population micro-census. Available at: http://www.gks.ru/free_doc/new_site/population/demo/micro-perepis/finish/micro-perepis.html

[10] Official web-page of Rosstat Available at: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/population/demography/#

[11] Results of the Complex study of population's living conditions, 2016. Official web-page of Rosstat. Available at: //http://www.gks.ru/free_doc/new_site/KOUZ16/index.html(accessed: 14.05.2019).

[12] Selective observation of population's reproductive plans data, 2017. Official Rosstat web-page. Available at: http://www.gks.ru/free_doc/new_site/RPN17/index.html

groups of Russian regions (83 regions) depending on the dynamics of birth rate, poverty level, and development of pre-school care system. It let us to formulate conclusions about different impact of family policy measures on regions with specifics of demographic and socio-economic development.

Approaches to assessing effectiveness of family policy

Effectiveness of family policy is largely determined by the extent to which the strategy of activity takes into account trends of transformation and characteristics of the family institution [1, p. 103]. A modern family is based on a model of demographic behavior, characterized by a flexible approach to choosing a life path, a variety of different lifestyles [2]. Research in the field of family policy methodology and practice in many countries is aimed at finding efficient models of family policy and evaluating the effectiveness of measures taken, factors that determine families' need for certain support measures.

On the one hand, the analysis of family policy in countries of Central and Eastern Europe allows researchers to form its typology and draw a conclusion about the fertility decline, which has not been prevented by family policy so far [3]. However, this result, although it might have a debatable nature, does not cancel the search for promising methods and measures of family policy implementation. Researchers from many countries of the world are puzzled by the search for efficient measures of family policy. The most important study area is the search for valid methods for evaluating the effectiveness of implemented measures [4, p. 68; 5, p. 112], including demographic policy measures that significantly affect interests of families with children [6, p. 60, pp. 44–47; 7, p. 60; 8; 9; 10]. However, this problem raises a methodological issue on the possibility of evaluating effectiveness.

Among the measures of family policy, researchers highlight measures of economic support for families with children, as well as the creation of conditions for combining family and professional responsibilities of parents. The analysis of social measures showed that, if the number of children attending preschool institutions increases by 20 %, the fertility of a cohort increases by 0.05 children. A number of studies have noted "extremely strong positive relationship between fertility and proper organization of child care services" [11; 12, p. 230]. Research in Spain, based on data from the European Community Household Panel for 1994–2001, confirmed the positive impact of the availability of childcare facilities on women's reproductive behavior [13, pp. 837–840].

The dependence between family income and birth rate is revealed. It is manifested in different ways in countries with different levels of economic development. Analysis of the relationship between economic development and fertility shows that the inverse J-shaped model exists (the birth rate growth on a certain level of income), but only after reaching a certain level of economic development and per capita income in the country [14].

A.H. Gauthier and J. Hatzius conduct an econometric analysis of the dependence between family benefits and fertility [15]. However, children's benefits are taken into account by families only when it makes up at least 10% of the total family income and is provided for a long time [16]. It should be noted that the vast majority of benefits in Russia do not meet these requirements.

Studies prove the need to take into account the "family–work" balance in family policy [17, p. 415; 18, p. 400]. At the same time, integral indicators are developed to assess the effectiveness of family policy. In particular, the Family policy index: it is based on such

characteristics as the provision of educational services by countries, parental leave, and economic transfers to support families with children under 3 years old — these are the most important characteristics of the modern family policy model [19].

Considering the work-life balance to be a significant factor of the family policy effectiveness, on the basis of data analysis from 26 European countries, the authors propose the calculation of the National work-life balance index which is a combination of five characteristics: time/schedule; work; family; health; policy [20]. These characteristics take into account the context, the environment in which modern families exist.

In addition to identifying the importance of implemented measures, such as assistance to a family in children care and their upbringing, research has shown that family policy in European countries is often aimed at the support of a "modernized" family lifestyle [21, pp. 915–917]. G. Esping Andersen and F.C. Billari come to the conclusion that the spread of gender-egalitarian norms might help reverse the trend of declining fertility and marriage [22, p. 18]. Family model does not remain unchanged; the family institute, being one of the oldest social institutes, is changing and experiencing the impact of a set of cultural, economic, and social factors. A study, conducted in European Union countries, let us conclude that, by promoting role compatibility and reducing gender costs of child's upbringing, family policy leads to an increase of the birth rate and leveling of the fertility differences depending on the level of mothers' education [22; 23].

These conclusions are true for many countries. The analysis, based on data from 42 countries, showed that countries with leading fertility and well-being rates stick to family policy that encourages combining parental responsibilities with employment and egalitarianism in the distribution of family responsibilities [24].

In particular, Northern Europe countries and France have developed some kind of a "support continuum" in order to assist parents during the first years of a child's life. This means providing paid parental leave, access to affordable and accessible pre-school facilities for children, and taking care of primary school age children who do not go to school. This policy has been implemented since the 1970s, creating a stable family-friendly environment in which parents are confident in their decision to have more children. This policy started in the 1970s and creates stable, favorable family environment which gives parents confidence in their decision to have more children. At the same time, there is a division of responsibility for the management of household activities and children's upbringing within the family itself, which also affects reproductive aspirations. The situation is very different in different countries. For example, while French and Korean women perform almost 4 hours of unpaid housework a day, French men help around the house for almost two and a half hours a day, while Korean men, on average, devote 45 minutes of their time [25, p. 170; 26; 27].

Despite the common goal, methods of assistance are different. Finland and Sweden have policies that ensure continuous support for parents until their children reach adolescence: flexible parental leave, affordable high-quality child care services, and reduced working hours for parents with young children. Canada and the UK opted for lower tax rates compared to higher costs of social services, although both countries have recently begun expanding parents' assistance.

The problem faced by researchers and management of social policy is caused not only by multidimensional functioning of a modern family, its relationships with other social institutions, but also by the complexity of measures implemented in families' interests within various areas of social activity.

The synergistic effect of family policy measures poses methodological difficulties for researchers who aim to evaluate each of these measures separately. In particular, revealing the influence of state policy on the birth rate in Sweden, J. Walker concludes that "they [parental benefits] are strongly linked to women's wages combined with constant changes of income tax laws and other wage-related factors, making it impossible to assess the impact of parental benefits separately" [25]. A similar situation is typical of Russia. O.G. Isupova believes that it is difficult to assess the effectiveness of family policy measures, since it is very difficult to offer a reasonable calculation mechanism. Moreover, birth rate changes can be explained by other processes occurring in society simultaneously with the introduction of family policy measures [26]. At the very least, it is difficult to identify the impact of individual programs and concepts on increasing fertility.

Recent actualization of Russian family policy and the formation of a unified logic of strategic documents led to the search for methods of evaluating the effectiveness of measures taken and identifying the most efficient ones. At the same time, the authors' opinions differ in the assessment of the Russian family policy model. A.A. Tkachenko in his work notes the duality of Russian family policy [27, p. 50]. The author assesses the current policy of birth rate stimulation as the support of low-income families.

E.V. Kochkina, after analyzing the system of indicators and evaluating the effectiveness of Russian social policy in 2012−2015, concluded that there is the inefficiency of public expenditures on families and children's support. Perhaps, the inefficiency of family policy is caused by irrational spending of funds [28, p. 155].

Nowadays, the effectiveness of existing policy measures concerning family planning and birth support is often questioned [29]. A number of authors, in particular M.V. Andreev, S.V. Zakharov [30], believe that sample studies' data do not allow us to speak about the significant effectiveness of modern Russian policy's measures aimed at increasing the birth rate.

Special attention is given to the assessment of the "maternity capital" program's impact on birth rate increase in 2007−2015, although this topic is quite debatable. In this period of time, Russian policy was aimed at stimulation of birth rates and families' reproductive function through the "maternity capital" program. During the analysis of the effectiveness of recent Russian demographic policy measures (in particular, the introduction of so-called "maternity capital" for stimulation of the birth of the 2nd and subsequent children in 2007), a retrospective forecast of the special birth coefficient for 2007−2008, based on 1987−2006 data, was conducted. The calculation of hypothetical number of births for 2007 and 2008, with the condition that age-related birth rates remained at the 2006 level, showed that the actual number of births in 2007 was 8.3%, higher, in 2008 − by 15.2%, than it could have been, if the previously existing trends had been preserved [31].

The impact of introduced "maternity capital" program on birth increase in Russia is defined in the work written by F. Slonimczyk and A.Yurko − per 0.15 children based on the value of the total fertility rate [32, p. 270].

However, E. Borozdina, A. Rotkirch, and A. Temkina believe that everything is not so clear, and Russian women and families do not believe in the "maternity capital" program and Russian social policy, because it sends contradictory messages [33]. Apparently, we can say that the effect of the program "maternity capital" has exhausted itself. It is worth thinking about the introduction of systemic support measures that take into account the current situation of a family and Russians' lifestyle.

Thus, L.A. Popova [34, p. 85] speaks about the effectiveness of federal and regional family capital programs in ensuring the reproduction regime of country's population, but, at the same time, she emphasizes the need to take measures within the framework of demographic and family policy that ensure the economic independence of families, without which the family institution will not be able to fully function.

V.V. Elizarov, after analyzing goals of family policy until 2024, concludes that it is necessary to differentiate target values for regions and to outline annual dynamics of target values as realistically as possible [36]. Of course, family life models are regionally differentiated, but it is not exactly necessary to consider the approach, which includes such details of target values in relation to population's reproductive behavior, to assessing effectiveness of family policy optimal.

Speaking about the prospects of family policy, A.I. Antonov [35] believes that the effectiveness of family and demographic policy can only be achieved through increasing the value of family and child lifestyle. However, how can this be achieved? We need a truly scientific justification of the strategy of family and demographic policies, which is not declarative and takes into account the complexity of the demographic behavior of a modern man. The value of a family is determined by the attitude of

society to it, the place it occupies in a person's life, and the role that a family plays in the system of life priorities. In order to be effective, family policy must have long-term, systemic nature and be aimed at creating conditions that enable the family institution to function and meet needs of families within modern society and patterns of economic relations.

In many cases, in the process of forming a strategy of activities concerning Russian family policy, there is no clear link between the goals of activity and indicators of its achievement. Also, there is no justification of target indicators' values. Complex issues that need to be addressed in family's interests, such as enabling parents to combine family and professional roles, creating a "family—work" balance, and requirement to combine efforts of various actors, including employers, remain outside the scope of family policy. This probably explains the lack of effectiveness of implemented programs and measures.

Speaking about the assessment of family policy by its recipients, Russian researchers say that people, in general, appreciate measures related to monetary payments more. They include interest-free loans (money received immediately, and it is not necessary to think for awhile about paying back), federal and regional maternity (family) capital, monthly payments for each child up until they are three years old, and monthly subsistence payments for the third and each subsequent child [37, p. 260]. In a certain degree, this situation was caused by low living standards of families with several children. It makes such families very susceptible to economic support measures.

For families in Russia, just like for other countries, economic measures of support, efficiency of which was proven in many projects, implemented by researchers in different countries, are very important. Its impact on Russian families has its own specifics

due to significant differentiation of regions' economic development, its opportunities to develop social infrastructure and support decent living standards among families with children. However, transformation of the family institute in Russia moves in the same direction as in other countries. It shows the necessity to solve modern family problems with methods of family policy. It is the creation of conditions for the successful functioning of a family with several children that will help to increase the value of family lifestyle.

Effectiveness of family policy in Russia

Family policy measures, aimed at increasing the reproductive potential of Russian families, including the payment of "maternity capital", in some way affected the dynamics of fertility and the structure of families. However, despite the increase of the birth rate, which continued until 2016, according to the structure of households, a significant part of families have only one child, although the share of such families has decreased. By 2015 (according to the micro-census of the population), the share of single-child households decreased to 59.8% (65.5% in 2010), while the share of two-child households increased to 31.1% (27.5% in 2010) and three-child households – to 9.1% (2010 – 7.0%).

Besides, the relative number of full families (with two parents) has increased among family households: if in 2002 the number of full families was 3 times higher than the number of single-parent families (incomplete families), the excess reached 3.3 times in 2015. The number of children, born in a registered marriage, is increasing: while in 2005 the proportion of children, born out of marriage, reached almost 30%, it had fallen to 21% by 2016[13].
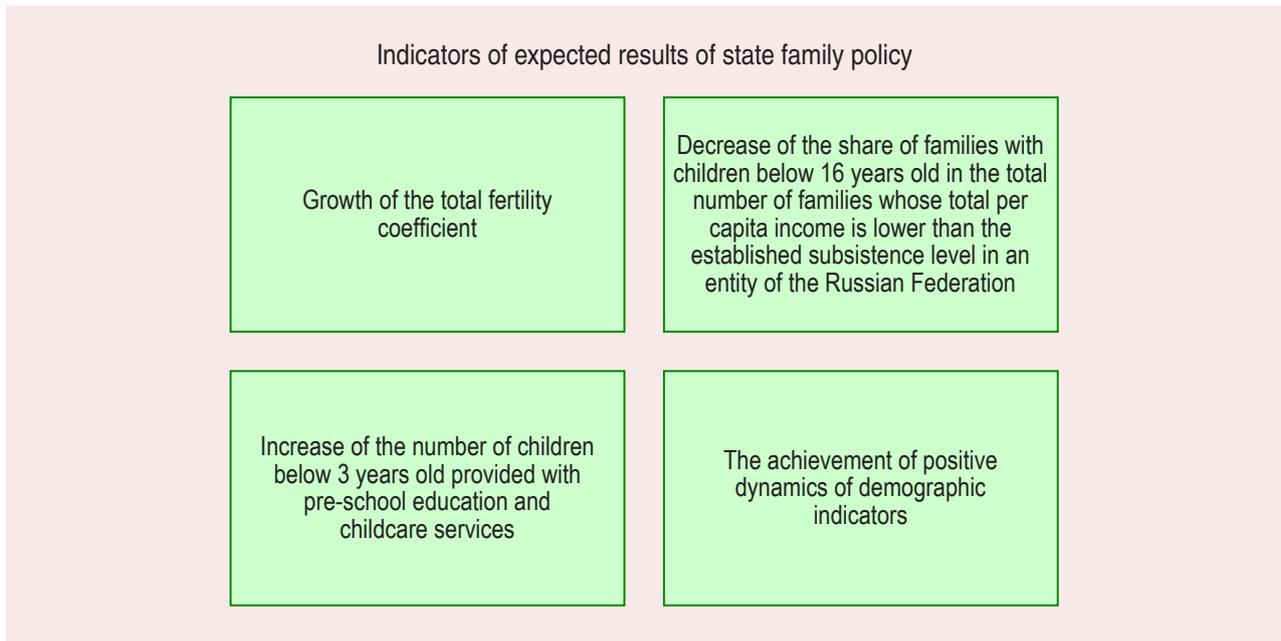
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[13] Calculated according to: The Demographic Yearbook of Russia-2017. Available at: http://www.gks.ru/bgd/regl/B17_16/Main.htm

However, long-term trends continue. The birth rate is getting old. The average age of a mother at birth continues to increase. If the average age of mothers, who gave birth to their first child before 1994, was 19.1 years, it increased to 26.6 years by 2015–2017. Over the same period, the average protogenetic interval (the period from marriage to the birth of the first child) increased by 3 times.

The main indicator of the effectiveness (expected result) of the National project "Demography" is the total fertility rate – the number of children born by a woman during her entire reproductive age (15–49 years). However, this indicator, like several others, was proposed for evaluating the effectiveness of Concept of State Family Policy in 2014 (*Figure*).

The total fertility coefficient, which is one of the most important demographic indicators, was 1.75 children per 1 woman of reproductive age in 2014. Its growth began in 2006, a few years before the adoption of Concept. By 2017, the indicator had dropped to 1.62 due to demographic (shifts in the birth calendar) and economic factors. The value of the indicator is still far from the level that provides, at least, a simple reproduction of the population (2.1–2.2 children). According to Rosstat's forecast, which takes into account trends in fertility, mortality, and the gender, age structure of the population, by 2024, the total fertility rate, depending on the forecast version, will be between 1.54 to 1.74 children. At the same time, the goal of the National project "Demography" is to increase the indicator to 1.7 children. In this regard, the contribution of the National project, along with the measures taken in accordance with the Plan of implementation of Concept of state family policy, to increasing the birth rate is not very clear.

Data from a Selective survey of the po-pulation's reproductive plans, conducted by

Indicators of expected results of state family policy

Growth of the total fertility coefficient	Decrease of the share of families with children below 16 years old in the total number of families whose total per capita income is lower than the established subsistence level in an entity of the Russian Federation
Increase of the number of children below 3 years old provided with pre-school education and childcare services	The achievement of positive dynamics of demographic indicators

Rosstat in 2017, showed that 11.5% of women decided to give birth to their first child, who they would not afford without "maternity capital", 15.6% of women gave a similar response in relation to the second child, and 19.5% — in relation to the third one. The calculation, based on data on the distribution of birth numbers in 2007—2017 by the order of birth, showed that state support measures in the form of "maternity capital" gave a 15% increase of birth numbers in this period (2.9 million births). It can be assumed that the extension of the "maternity capital" program until 2021 will allow achieving the set goals — the value of the total coefficient of 1.7 children (to overcome the negative impact of the structural factor in the following years — the reduction of the number of reproductive age women). The number of women of reproductive age (15—49 years) (according to Rosstat forecast)[14] will decrease by 2.8—3.5% by 2024: especially, the

number of young women. Even if the birth rate remains at the level of 2016, the number of births will be reduced by 20—36%. Such prospects show the need for serious actions in the area of family support.

Another indicator of state family policy's expected results is the percentage of families with children living below the poverty line. It should be noted that the poverty level among families with children continued to increase. For example, the percentage of children under the age of 16 (18) who live in households with per capita income below the subsistence level increased from 20.7% in 2014 to 25.9% by 2017. It was the significant level of poverty of Russians that required the adoption of a specialized program.

The development of so-called flexible labor market should be a priority: people with family obligations should not be deprived of the opportunity to implement their professional potential. Referring to data from the Comprehensive survey of population's living conditions, it might be noted that 25.4% of women, who look for work, would like to get a part-time job.

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[14] Calculated according to: Population by one-year age group. Forecast. Available at: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/population/demography/#

Besides, unresolved issues in the sphere of care for children, elderly people, disabled persons, and a general lack of social infrastructure have a negative impact on demographic indicators: family members become responsible for taking care of children and disabled family members. A comprehensive survey of population's living conditions, conducted by Rosstat in 2016, shows that 36.9% of women and 24.6% of men take care of their children every day, 6.7% of women and 4.1% of men take care of disabled people on the daily basis. Women with children spend 34.8 hours a week looking after them. This number is comparable to the length of a working week. Men spend 18.3 hours a week doing the same activities — it is almost two times less.

In 2014, the provision of preschool education for children, aged from 1 to 6, was 64.6%; in 2017, three years after the beginning of Concept of state family policy, it was 66.5%. The provision of places in pre-school educational organizations for children, including child care and supervision, increased from 612 to 633 places per 1000 children in 2014—2017[15]. It should be noted that measures for development of pre-school education system and the division with the family of pre-school children raising function were provided within the framework of not only Concept of state family policy, but also within Russian National Children's Strategy for 2012—2017, "Decade of Childhood" initiative, National Action Strategy for Women (2017—2022), roadmap "Changes in social sectors aimed at improving the efficiency of education and science".

In 2017, the number of pre-school students reached 7477.9 thousand people, which was 66.1% of all children, aged between 1—6 years.

[15] According to Rosstat data. Available at: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/population/motherhood/#

It is clear that not all parents consider their children's visits to kindergarten the best option. In 2016, 47.8% of parents, whose children do not go to kindergartens, believed that "the child is better at home". During the implementation of Concept, the percentage of children who do not attend preschool institutions due to lack of places has decreased. In 2014, 23.4% of children, aged between 3—6 years, did not attend pre-school educational organizations due to lack of places: in 2016, this number decreased to 10.3%. However, the problem of the shortage of places in pre-school educational institutions remains unsolved.

We might conclude that, on the one hand, the same indicators measure the effectiveness of several strategic programs, aimed at solution of demographic problems and families' assistance. However, the problem of availability of pre-school education and child-care services remains. It affects the reproductive behavior of Russians, creates a "family — work" conflict of interests, and distorts the structure of employment, especially for women. The scale of poverty remains significant, and the risk of becoming poor people is still higher for families with children than for other population categories. We can hardly expect a significant increase of the birth rate in the following years. Taking into account the duplication of indicators of expected results in various strategic documents on family policy, it is not possible to correctly assess the effectiveness of any individual initiative. It can only be about the effectiveness of the whole state policy.

Regional differentiation of family policy indicators

There are significant differences in the level and dynamics of indicators, which are analyzed as primary indicators of family policy effectiveness. It goes for demographic and socio-economic characteristics.

Russian regions are differentiated according to the level of poverty among households with children (*Tab.1*). The poverty level among families with children is much higher than average indicator for the whole population (2017 − 13.2%).

Table 1. The level of poverty among households with children, 2016

Share (%) of households with children below the poverty line	Number of regions
Less than 10	3
11–20	7
20–25	16
25–30	14
30–35	23
35–40	9
More than 40	13

Source: calculated according to the Comprehensive survey of population's living conditions. Available at: http://www.gks.ru/free_doc/new_site/KOUZ16/index.html (accessed: 14.03.2019).

In 2016, in 13 regions of the country, the poverty level of households was higher than 40% (the Republic of North Ossetia − Alania, the Republic of Buryatia, the Karachay-Cherkess Republic, the Kurgan Oblast, the Republic of Dagestan, the Republic of Kalmykia, the Chechen Republic, the Pskov Oblast, the Republic of Crimea, the Altai Republic, the Kabardino-Balkar Republic, the Republic of Ingushetia, the Tyva Republic). In more than a half of country's regions, the poverty level among families with children was more than 30%.

Of course, there is a correlation between the birth rate and standards of living in Russian regions. A relatively higher birth rate is accompanied by an increase of poverty due to the increased load dependency with low incomes. Families with children's low standards of living with make them susceptible to economic support measures.

The most important factor, influencing the family's ability to implement their reproductive plans, is the development of social infrastructure that provides child care and helps resolve the "family−work" conflict for working parents. The availability of places in pre-school institutions has increased in recent years and continues to increase.

The dispersion analysis showed that hypotheses about the impact of the poverty level (F criterion is 2.345, the significance level p=0.045) and coverage of pre-school institutions (F-criterion is 3.325, the significance level p=0.049) on the change of the birth rate in Russian regions are not rejected. The birth rate in regions with different levels of poverty and the development of pre-school care and education differ.

In other words, the birth rate in country's regions fluctuates, as do the level of poverty and the availability of pre-school education. It is not possible to speak unequivocally about the direct impact of socio-economic factors on the birth rate. Most likely, it is about differences in the birth rate models and the socio-economic situation in regions.

The cluster analysis, carried out by the K-mediums method, made it possible to form typological groups of Russian regions in terms of fertility dynamics and measures of demographic and family policy. This method was successfully applied to the study of a family situation and family policy [38, p. 1179]. The use of the cluster analysis method showed that, in the context of the impact on the birth rate, a major role is played by the growth dynamics of the provision of places in preschool institutions, rather than achieved level.

The cluster analysis, conducted for 83 Russian regions, showed that they can be divided into 4 clusters on the basis of data:

X_1 − total fertility rate (number of children born by 1 woman during the entire reproductive period), 2017;

X_2 – poverty level among families with children (percentage of households with children below the poverty line,%), 2016;

X_3 – growth rate of pre-school education provision for children, aged 1−6 years (% from the number of children aged 1−6 years), 2017/2008, %;

X_4 – growth rate of the total fertility coefficient, 2017/2008, %.

The cluster analysis was performed using the Ward method. Due to different measurement units, data for studied indicators was pre-standardized.

The hypothesis on the equality of dispersions within and between clusters is rejected for all variables with 3 and 79 degrees of freedom. The value of the p-probability of error, while accepting the hypothesis of variance inequality, is extremely low, no more than 0.001 (the F-criterion is important for all variables at the level of, at least, 0.001). This allows us to say that the hypothesis of variances inequality is accepted and, accordingly, the clusters are formed correctly.

The distribution of regions by clusters and average values of variables are shown in *Tables 2* and *3*. The analysis of variables' values in clusters shows that the growth rate of fertility after 2008 was higher in regions where the poverty level was lower. At the same time, the birth rate increased more intensively, where the initial level of the total birth rate was lower. In other words, there was an increase in the number of first and third births.

On the contrary, the availability of places for children in pre-school institutions increased more intensively in regions, where the initial availability of pre-school education and supervision services was the lowest. In fact, the implementation of family policy over the past decade has filled in the gaps in the organization of a network of pre-school institutions.

Table 2. Average values of variables in clusters

Variable	Cluster 1 (26 regions)	Cluster 2 (35 regions)	Cluster 3 (20 regions)	Cluster 4 (2 regions)
X_1 – total fertility rate, children	1.61	1.67	1.70	2.25
X_2 – poverty level among families with children, %	18.8	33.6	37.7	57.7
X_3 – growth rate of pre-school education provision for children, aged 1–6 years, %	109.9	108.4	130.4	415.9
X_4 – growth rate of the total fertility coefficient, %	111.3	107.1	101.2	75.7

Table 3. Content of clusters

Cluster 1 (26 regions)	Belgorod Oblast, Kursk Oblast, Ivanovo Oblast, Kaluga Oblast, Moscow Oblast, Tula Oblast, Yaroslavl Oblast, Moscow, Komi Republic, Leningrad Oblast, Murmansk Oblast, Novgorod Oblast, Saint-Petersburg, Republic of Bashkortostan, Republic of Mordovia, Republic of Tatarstan (Tatarstan), Udmurt Republic, Krasnodar Krai, Nizhegorod Oblast, Sverdlovsk Oblast, Khanty-Mansiysk Autonomous Okrug, Yamalo-Nenets Autonomous Okrug, Tomsk Oblast, Khabarovsk Krai, Sakhalin Oblast, Chukotka Autonomous Okrug
Cluster 2 (35 regions)	Bryansk Oblast, Vladimir Oblast, Kostroma Oblast, Republic of North Ossetia – Alania, Oryol Oblast, Ryazan Oblast, Smolensk Oblast, Tver Oblast, Republic of Karelia, Arkhangelsk Oblast, Nenets Autonomous Okrug, Vologda Oblast, Pskov Oblast, Astrakhan Oblast, Perm Krai, Mari El Republic, Chuvash Republic – Chuvashia, Kirov Oblast, Orenburg Oblast, Samara Oblast, Kurgan Oblast, Saratov Oblast, Ulyanovsk Oblast, Tyumen Oblast, Chelyabinsk Oblast, Krasnoyarsk Krai, Irkutsk Oblast, Novosibirsk Oblast, Sakha Republic (Yakutia), Kamchatka Krai, Primorsky Krai, Amur Oblast, Magadan Oblast, Altai Krai, Zabaykalsky Krai
Cluster 3 (20 regions)	Republic of Dagestan, Voronezh Oblast, Republic of Kalmykia, Tambov Oblast, Kabardino-Balkar Republic, Karachay-Cherkess Republic, Altai Republic, Tyva Republic, Republic of Buryatia, Lipetsk Oblast, Kaliningrad Oblast, Republic of Adygea (Adygea), Volgograd Oblast, Rostov Oblast, Stavropol Krai, Penza Oblast, Republic of Khakassia, Kemerovo Oblast, Omsk Oblast, Jewish Autonomous Oblast
Cluster 4 (2 regions)	Republic of Ingushetia, Chechen Republic.

The analysis of clusters shows that the situation with the birth rate and its dynamics, as well as socio-economic characteristics of family life in Russian regions, is very heterogeneous. 26 regions of cluster 1 have the lowest levels of fertility rates, despite the most significant growth in recent years, and poverty among families with children. Provision of 1—6 years old children with pre-school education services increased only by 9.9%.

Cluster 2 is the most typical. 35 Russian regions were included in it. They are characterized by higher birth levels, in comparison with cluster 1 regions, but birth rates' growth, on the contrary, is lower. There is a significant level of child poverty in these regions (33.6%, one third of families with children live below the poverty line).

20 regions of cluster 3 are characterized by higher levels of birth (although it did not increase during the analyzed period) and poverty among families with children (in comparison with clusters 1 and 2), as well as a more significant growth rate of children's provision with pre-school education in recent years (30.4% increase).

Two regions, included in cluster 4 (the Republic of Ingushetia, the Chechen Republic), have significantly higher levels of birth and poverty, in comparison with other regions, noticeable growth rates of provision of pre-school institutions' services, and huge (25%) birth decrease in the last decade. This situation made it possible to put them into a separate cluster.

The analysis of clusters' content (*Tab. 3*) does not reveal any geographical features in the formation of regions' typological groups. It is more about the specifics of a socio-economic situation in regions, included into a particular cluster.

The results of the cluster analysis allow us to say that there is an equalization of the birth rate in Russian regions. There is a significant decrease of the fertility level in regions with a high fertility and some growth in regions with relatively lower fertility, caused by demographic and family policy measures.

While implementing family policy measures in regions, it is necessary to remember that fertility grows in regions, where the level of life among families with children is higher, and the provision of pre-school education services is better.

The high birth rate model in regions with traditionally higher number of large families seems to have exhausted itself. The complexity of the family life organization and the need to ensure decent living standards contradict the large families' attitudes. We should not assume that fertility dynamics in regions with traditionally higher birth rates will improve average national numbers. Fertility also declines in these regions, and birth rates are highly sensitive to the characteristics of a socio-economic well-being.

Regions are quite different in terms of socio-economic opportunities for providing family support. In more wealthy regions, the level of provision with pre-school education is higher. In 2008-2017, the fertility increase in them was more significant than in less prosperous regions with initially higher birth rates.

The prospects of increasing the birth rate in Russia are probably related to solving the problem of economic independence of the family and the issue of combining family and non-family roles by parents with minor children.

Low standards of living and insufficient provision of pre-school education services led to lower fertility growth rates (in some regions — to decrease), despite birth stimulation with economic support measures (in particular, "maternity capital" program).

Conclusions

The results of the study showed that Russia could be characterized by a significant differentiation of regions in terms of the fertility rate, its dynamics, and response to family policy measures, which contributes to the development of the theory and practice of socio-demographic studies of the family and family policy. The analysis of indicators, which serve as indicators of the effectiveness of several strategic documents, makes it possible to formulate certain recommendations for the implementation of family policy.

Families are affected by family and demographic policies. However, while assisting a family in implementation of its functions (most of all, reproductive and life-saving), areas and measures of support overlap: often it is difficult to classify them. This is where the logic of socio-economic policy faces formalism and duplication of activities. It is impossible to identify and evaluate the effectiveness of individual strategic programs in the area of family and demographic policy, because such measures as the fertility rate increase, the reduction of the poverty level among families with children, and the growth of the pre-school services' availability are integral elements of various programs. We can only assess the effectiveness of the state family policy as a whole.

Many program documents include a set of measures for overcoming the poverty of families and helping them raise children. The poverty level of families with children, despite the measures included in a number of strategic documents, remains very significant. However, the current model of fertility rate in Russia dynamically responses to socio-economic conditions of family life. The implementation of "maternity capital" program led to the increase of fertility indicators in regions, where its level was initially lower. There was a decrease of regional differentiation of fertility indicators. The implementation of reproductive plans is slowed down by ordinary shortage of means for fulfilling child's basic needs in the environment of mass poverty among families with children.

The living standards of families with children cannot be raised only by means of social assistance at the households' current poverty level. Systemic changes in the system of wages are required. These measures should be a center of Russian families' economic assistance.

Support for families in the form of the "maternity capital" program has had a certain impact on the growth of the birth rate. However, in the long term, taking into account the dynamics of the total fertility rate and the nature of the gender and age structure of the population, large-scale measures of economic support for families are necessary to increase their economic independence, if the state is interested in increasing the birth rate.

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Differentiation of regions according to the level of fertility is reduced. At the same time, the study showed that families respond differently to family policy measures, and the low level of availability of pre-school education services is perceived as a problem in regions with relatively higher standards of living. In many Russian regions, the risk of entering poverty zone is quite significant for families with children, which makes them less receptive to current economic measures of family policy. Poor families need systematic support which would help them overcome poverty.

In Russia, at the current development stage, there are no formed social mechanisms that would allow combining family responsibilities and professional growth in the modern model of economic life. Thus, men and women often make a choice in favor of a professional career: they do not want to sacrifice anything in the interests of a family and children. In the national project "Demography", there are no measures which would allow families go along the way of forming "family–job" balance: the development of pre-school institutions is an only exception. It should be remembered that families from more prosperous regions are more receptive to the availability of a good pre-school education during the implementation of their reproductive plans.

Current demographic problems and the transformation of the family institution open up new opportunities for increasing the prestige of a family lifestyle. It should be taken into account in the further development of the national project "Demography". From our point of view, there is a need for systemic changes of the labor market, long-term programs for the development of a flexible labor market and family entrepreneurship, and the creation of a social infrastructure that allows combining the needs of families and professional fulfillment. At the same time, economic incentives are needed for employers who carry out activities in the interests of employees with family responsibilities. It is necessary to reduce the tax burden on families with several children by switching to a family tax on the income of family members (it was proposed in the discussion on the plan for the implementation of Concept of state family policy). With the help of the family benefits system, it is possible to increase the income of people with family responsibilities, taking into account their dependency burden. This will reduce the level of poverty among families with several children.

Most likely, there will be no immediate results. Complex solutions and the involvement of various actors in the solution of family problems require long-term, financially expensive programs which should be implemented at the federal level and take into account the regional specifics of the situation concerning families with children. It is necessary to increase the share of expenditures on family and maternity benefits in relation to the gross domestic product of the country and the gross regional products of the regions to 2.2%, as it was proposed in the Decree on basic directions of state family policy of 1996. It should be mentioned that the ratio of spending on family and maternity benefits to GDP in Russia decreased from 1% in 1996–1997 to 0.9% in 2016 [39]. Such dynamics indirectly indicate the real significance of family policy in the system of state activity.

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Regional Reserves for Raising Life Expectancy in the Conditions of Convergence of Its Level*

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Abstract. The goal of the paper is to assess changes in the regional differentiation of life expectancy in Russia for 2003–2017, to consider the features of the level and growth rate of life expectancy, gender differences in the indicator, the difference between urban and rural areas, the structure of mortality due to death, the level of infant mortality in the regions of Russia; the paper also defines regional reserves for further increase in life expectancy. The relevance of the topic is due to significant regional differentiation, Russia's significant lagging behind developed countries, and the goals associated with this field. We arrange Russian regions into nine groups with annual intervals of the indicator and evaluate the changes in the groups in 2003–2017. We find out that in the conditions of growing life expectancy there has been a marked convergence of regions; they approached the Russian average level according to this indicator.

Regional convergence has occurred at the expense of the extreme groups in terms of the indicator, and primarily due to the lagging regions getting closer to the leaders; i.e. we observe the catch-up nature of convergence. This suggests that over the period of 2004–2017, the relatively easy-to-implement life expectancy growth reserves, which are typical for low-indicator regions, have been used quite well, while further growth in high-indicator regions is not an easy task, since the possibilities of first-order factors, such as gender differentiation, the difference between urban and rural indicators, the share of mortality from external causes, and infant mortality rate, have been largely implemented. Nevertheless, all nine groups of regions still have reserves to increase life expectancy, due to certain growth factors of the first order. The groups with the most unfavorable level of the indicator have the greatest reserves. However, factors such as the lag in the rural indicator and the value of infant mortality in the group with very high life expectancy provide opportunities for further increase due to growth factors of the first order.

Key words: life expectancy, Russian regions, regional convergence, grouping, first-order growth factors, gender differentiation, differences between urban and rural settlements, causes of death, infant mortality.

Introduction

May 7, 2018 the Russian President signed the Decree "On the national goals and strategic objectives for development of the Russian Federation for the period up to 2024"[1], which declares that one of Russia's development priorities is to achieve life expectancy of 78 years by 2024, and 80 years by 2030. The scale of the tasks at hand and Russia's significant lag behind the industrialized countries determine the relevance of research in the field of reserves and opportunities for increasing life expectancy of Russians.

Over the past decade and a half, Russia has made significant progress in reducing mortality and increasing life expectancy. In 2003–2017, the crude death rate decreased from 16.4 per 1,000 people to 12.4‰ – by 24.4% (in 2018, a slight increase was registered)[2]. In parallel with the decline, there have been positive changes in the structure of mortality due to causes. The most significant rates of decline are typical of deaths from external causes (accidents,

poisonings, injuries, murders, suicides); as a result, in 2006, this group moved from the second to the third position in the structure of mortality due to causes, and the second position was occupied by mortality due to neoplasms. Life expectancy of Russians increased by 8.1 years and reached 72.9 years in 2018 (67.8 for men and 77.8 for women). These are the maximum values in the history of Russia. Nevertheless, the gap from developed countries is still about 12 years, more than 15 years for men and more than 10 years for women [1, p. 64].

In 2003–2018, the indicator for men increased more significantly – by 9.3 years (from 58.5 to 67.8 years), for women – by 5.9 years (from 71.9 to 77.8 years). I.e. along with the increase in life expectancy in Russia there was a reduction in gender differentiation in this indicator from 13.4 to 10.0 years, but the indicator for men is still lagging significantly behind; it represents a considerable potential for growth in life expectancy [2]. In urban areas, the level of this indicator reached 73.3 years in 2018, in rural areas – 71.7 years. Until 2009, the increase in life expectancy of the urban population was more significant; differences

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[1] Decree of the President of the Russian Federation "On the national goals and strategic objectives for development of the Russian Federation for the period up to 2024" dated May 7, 2018 No. 204. Available at: http://www.kremlin.ru/acts/news/57425

[2] http://www.gks.ru

between the city and the village in 2003−2009 increased from 2.0 to 2.9 years. In recent years, the rural indicator has been increasing at a higher rate. However, the period 2003-2018 as a whole does not yet show a noticeable reduction in the backlog: in 2018, its level is 1.6 years lower than the urban one − the tightening of the life expectancy of the rural population is also a growth reserve [3].

The Russian nationwide life expectancy indicator is made up of indicators in different regions, which in 2017 vary from 66 years in Chukotka Autonomous Okrug and the Republic of Tuva to almost 82 years in the Republic of Ingushetia. Accordingly, one of the most important conditions for achieving the goals set in the field of life expectancy of the Russian population is to reduce regional differentiation by pulling lagging regions to the level of leaders.

The goal of this article is to assess changes in the regional differentiation of life expectancy of Russians for 2003−2017; the paper also investigates the level and growth of life expectancy, gender differences in the indicator, the differences between urban and rural areas, the structure of mortality due to causes, infant mortality in the regions of Russia; we also point out regional reserves for further growth in life expectancy of Russians.

Main approaches to the study of regional convergence/divergence of life expectancy

Stability of development of any system is defined by balance of dynamics of its separate components. Significant regional differentiation in terms of demographic indicators is an obstacle to the demographic development of the country and the implementation of the state demographic policy, thus it is necessary to study it. The study of demographic convergence/divergence, i.e. reduction/increase in the contrast of the distribution of indicators between regions is also important for demo-

graphic forecasting, which in a country with a huge territory and diverse socio-economic and climatic conditions should be based on stable trends determined by the consistency of changes occurring in different regions [4].

The theoretical understanding of the phenomenon of demographic convergence and the coherent trajectory of development of countries and regions is presented in the works of the founders of the concepts of the first and second demographic transition [5, 6, 7, 8]. The fundamental basis for explaining the dynamics of life expectancy and the impact of various groups of factors on it is A. Omran's theory of epidemiological transition, which can be considered part of the demographic transition [9] and which was developed in the works of other authors, including domestic ones [10, 11, 12, 13, 14]. Practical studies are devoted to the convergence/divergence of countries and regions in terms of life expectancy [15, 16, 17], as well as changes in the differentiation of mortality in different population groups [18].

In Russia, mortality and life expectancy in the regional context are most often investigated at the level of individual constituent enities [1, 19, 20] or groups of territories [21, 22, 23, 24] in comparison with the national level. There are studies devoted to the comparative analysis and typology of Russian regions according to the structure of mortality and the level of life expectancy [25, 26, 27, 28, 29]. However, in our opinion, the topic of the article becomes even more relevant due to the lack of works devoted to the convergence/divergence of the Russian regions in terms of life expectancy and their comprehensive comparative analysis of the level and growth rate of the indicator, its gender and inter-settlement differentiation, the structure of mortality by causes and the magnitude of infant mortality, in light of the goals to increase the life expectancy of Russians.

Convergence/divergence of the processes under consideration is studied with the help of a whole range of differentiation indicators. Studies that use statistical tools for convergence analysis are mainly related to the study of the economic sphere of society. In the field of demography, this tool is rarely used [4]. The most well-known and easily applied technique is σ-convergence [30], which will be used in our study.

Results of the assessment of changes in regional differentiation

In 2003, in 57 RF constituent entities and in the Republic of Crimea, life expectancy was lower than the Russian average (64.8 years); life expectancy was higher than the national average in 26 regions and in Sevastopol[3]. In 2017, the indicator was lower than in the whole country (72.7 years); in 55 RF constituent entities, in three regions (Chuvash Republic, Ryazan and Kirov oblasts) it is equal to the average Russian level, and it is higher than the Russian average in 27 regions[4]. That is, for 2003−2017, in the conditions of increasing life expectancy, the situation with the number of regions above and below the average Russian level has not changed fundamentally. There was only a slight decrease in the number of constituent entities with an indicator below the national average, because three regions achieved the average level.

However, during the period under consideration there was a decrease in the interregional spread of life expectancy values and consolidation of regions to the average level. In 2003, the difference between the maximum and minimum life expectancy was 20.2 years (74.4 years in Ingushetia and 54.2 in Tyva). In 2017, the minimax decreased to 15.5 years (81.6 years in Ingushetia and 66.1 years in Chukotka Autonomous Okrug) *(Tab. 1)*.

The regional convergence of Russians' life expectancy in 2003−2017 is also evidenced by the change in the standard deviation:

$$\sigma = \sqrt{\sum_{i=1}^{n} \frac{(x_i - \bar{x})^2}{n}},$$

where x_i − life expectancy in each region;

$\bar{x}$ − national Russian average value of the indicator;

n − number of regions.

The higher value of the standard deviation shows a greater diversity of regional levels of life expectancy in comparison with the national average. A lower value indicates that regional levels are more closely grouped around the average. The dispersion of Russian regions according to the value of life expectancy was 10.2 in 2003 and 5.4 in 2017. The standard deviation, respectively, decreased from 3.2 to 2.3. That is, in 2003−2017, there was a decrease in the dispersion of regions and their convergence with the average level.

Table 1. Variation in regional values of life expectancy in Russian in 2003 and 2017

Years	Minimum value, years	Maximum value, years	Difference between the maximum and minimum values, years	Difference between the maximum and minimum values, %	Ratio of the maximum value to the minimum value, fold
2003	54.2	74.4	20.2	37.3	1.37
2017	66.1	81.6	15.5	23.4	1.23
Sources: http://www.gks.ru, https://russia.duck.consulting/maps/96/2003, http://crimea.gks.ru, http://sevastopol.gks.ru					

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[3]   https://russia.duck.consulting/maps/96/2003; http://crimea.gks.ru; http://sevastopol.gks.ru

[4]   http://www.gks.ru

With the help of the principle of arranging the regions into one-year groups according to the range of life expectancy in 2003 and 2017, which is the same with respect to the average Russian level, we allocated nine groups: very high life level, high level, significantly above the national average, above the national average, national average, below the national average, significantly below the national average, low level, and very low level of life expectancy *(Tab. 2, Fig. 1)*.

As we can see, the regional convergence of life expectancy in the conditions of growth in 2004–2017 occurred at the expense of extreme groups, and primarily due to the improvement of the indicator in lagging regions, i.e. regional convergence has a catching up nature:

— the number of RF constituent entities with very low and low levels of life expectancy decreased from 26 to 12 — more than twice;

— the number of regions with life expectancy that is very high, high and significantly above the average decreased from 18 to 10 — not so much;

— due to this "counter shift", there was a significant increase in the composition of the groups with levels below the national average (from 8 to 25) and significantly below the national average (from 8 to 13) — in general, the number of entities in these two groups increased from 16 to 38;

— the total number of regions with the average Russian level of life expectancy and with the level above the national average has not changed, it is 25 in 2003 and in 2017.

It is obvious that in 2004–2017 the relatively easy-to-implement reserves for increasing life expectancy, which are typical of regions with a low level of the indicator, were well used. And in regions with high life expectancy, further growth is a very difficult task, as opportunities have largely been implemented.

In each group of regions, we analyzed the features of life expectancy growth in 2003–2017 and growth reserves, which are due to factors lying on the surface and available from official statistics. Let us call them growth factors of the first order. In their composition, we consider

Table 2. Grouping of Russian regions in relation to the average Russian level of life expectancy in 2003 and 2017

2003			2017		
Group	Number of regions		Group	Number of regions	
Very high level (68.3 years and more)	7	18	Very high level (76.2 years and more)	3	10
High level (67.3-68.2 years)	6		High level (75.2-76.1 years)	4	
Significantly above the national average level (66.3-67.2 years)	5		Significantly above the national average level (74.2-75.1 years)	3	
Above the national average level (65.3-66.2 years)	14	25	Above the national average level (73.2-74.1 years)	13	25
National average level (64.3-65.2 years)	11		National average level (72.2-73.1 years)	12	
Below the national average level (63.3-64.2 years)	8	16	Below the national average level (71.2-72.1 years)	25	38
Significantly below the national average level (62.3-63.2 years)	8		Significantly below the national average level (70.2-71.1 years)	13	
Low level (61.3-62.2 years)	12	26	Low level (69.2-70.1 years)	8	12
Very low level (under 61.2 years)	14		Very low level (under 69.1 years)	4	

Regional differentiation of life expectancy in Russia in 2003 and 2017

2003

2017

Life expectancy level
- Very high
- High
- Significantly above the national average
- Above the national average
- National average
- Below the national average
- Significantly below the national average
- Low
- Very low
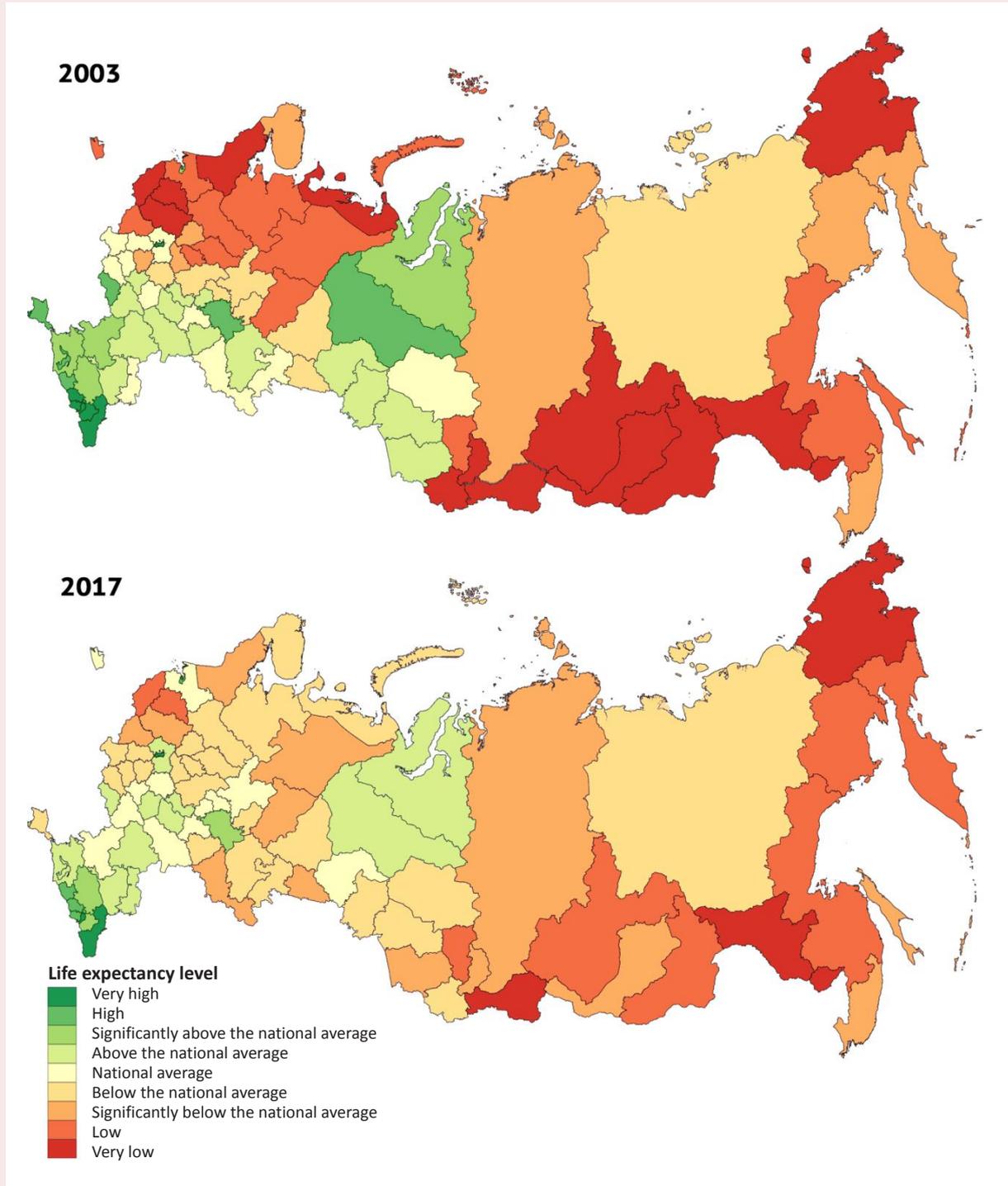
the size of the lag in the indicator for men, the differences between urban and rural areas, the share of mortality due to external causes, the level of infant mortality — in comparison with the national average.

Obviously, the regions with the most unfavorable level of life expectancy have the greatest reserves for growth due to the first-order factors, so we start the analysis of the groups from the bottom.

1. Very low level of life expectancy

Very low life expectancy up to 69.1 years is observed in four regions in 2017: Chukotka Autonomous Okrug, the Republic of Tyva, the Jewish Autonomous Oblast and the Amur Oblast. In 2003, all these constituent entities also belonged to the group with a very low level of life expectancy, which at that time consisted of the regions with an indicator up to 61.2 years and included 14 regions.

The Republic of Tuva, which occupied the lowest position in 2003, experienced a very significant increase in the indicator (by 12.1 years) in 2003−2017, and it lost the last position to Chukotka Autonomous Okrug. Both Chukotka and Tyva are distinguished by a very significant lag in the indicator of life expectancy and a huge, almost a quarter, share of mortality from external causes, which is also high in the Amur and Jewish oblasts. In addition to the Amur Oblast, which is characterized by low mortality in children under 12 months of age, the other three regions have the highest levels of infant mortality in the country. Significant reserves for the growth of life expectancy are also provided by the gender differentiation of the indicator, which, with the exception of that in the Republic of Tyva, significantly exceeds the average Russian level.

2. Low level of life expectancy

In eight RF constituent entities, life expectancy in 2017 ranges from 69.2 to 70.1 years. According to our classification, these are regions with a low level of the indicator. In 2003, a similar group included 12 regions with life expectancy from 61.3 to 62.2 years.

In most of the territories of this group (in Khabarovsk and Zabaikalsky krais, the Pskov, Novgorod and Irkutsk oblasts), the increase in life expectancy in 2003−2017 exceeds the national average, the indicator in the Kemerovo Oblast is almost at the national average level. The Kemerovo Oblast and Khabarovsk Krai in 2003 still belonged to the group with a low level of life expectancy; Zabaikalsky Krai, the Pskov, Novgorod and Irkutsk oblasts moved here from the group with a very low level. In contrast to the above six regions, in the Magadan Oblast and in Kamchatka Krai, the increase in life expectancy in 2003−2017 was significantly lower than the national average — these two constituent entities during the period under consideration moved away from the group with a more prosperous situation.

Almost all regions in the group with a low level of life expectancy are characterized by a rather significant gender differentiation of the indicator; it does not exceed the average Russian level only in Kamchatka and Zabaikalsky krais. The difference between urban and rural indicators of life, with the exception of the Novgorod and Kemerovo oblasts, is much larger than the Russian average. Almost everywhere the share of mortality from external causes is high, the only exception is the Novgorod Oblast. In addition to the Magadan and Pskov oblasts, infant mortality rate is higher than the Russian average indicator. That is, in this group of regions, despite a fairly significant increase in life expectancy, there are still significant reserves that depend on the structure of mortality due to causes, lagging of rural indicators and indicators for men, and an insufficient control over infant mortality.

3. Life expectancy significantly below the national average

In 13 Russia's constituent entities, life expectancy ranged from 70.2 to 71.1 years in 2017. This is a group of regions in which the level of the indicator is significantly below the national average. In 2003, the corresponding group included eight regions with life expectancy in the range of 62.3—73.2 years.

The expansion of the group was largely due to the fact that it included previously lagging territories. In the republics of Karelia, Komi, Buryatia and Khakassia, in Perm and Krasnoyarsk krais, in the Tver, Smolensk and Sakhalin oblasts in 2003—2017 there was a more significant increase in life expectancy than in Russia as a whole; and in Altai and Primorsky krais, in the Orenburg and Kurgan oblasts, the level was below average. The republics of Karelia, Buryatia and Khakassia and the Tver Oblast have improved their ranking positions in the period under review, having moved here from the bottom group with a very low level of life expectancy, skipping the group with a low level. The Republic of Komi, Perm Krai, the Smolensk and Sakhalin oblasts moved above from the group with a low level. Krasnoyarsk and Primorsky krais in 2003 belonged to the group of regions with the level of life expectancy significantly below the national average. The Kurgan Oblast moved here from the group of regions with the more prosperous situation; in 2003, the Orenburg Oblast belonged to the regions with the average level of life expectancy, and Altai Krai was in the group with life expectancy above the national average. That is, the specified constituent entities in the conditions of growth of life expectancy in Russia worsened their ranking positions very significantly.

All regions within this group are characterized by an increased gender differentiation of life expectancy and, except for the Orenburg and Tver oblasts, have a strong lag in the rural indicator. Only in Karelia, Altai Krai, and in the Tver and Smolensk oblasts, the share of external causes of death is insignificant. The situation with unnatural causes of death is also more or less favorable in the Orenburg Oblast and Primorsky Krai. In the remaining seven regions, they represent a significant reserve for life expectancy growth. Also, seven regions of the group — more than half — have the infant mortality rate above the average in Russia (except for the republics of Komi and Khakassia, Perm Krai, the Kurgan, Tver and Sakhalin oblasts). Thus, this group of regions has significant reserves due to gender differentiation, lag in the rural indicator, unfavorable structure of mortality due to causes, and increased infant mortality.

4. Life expectancy below the national average

The largest group of Russian regions — 25 constituent entities — is characterized in 2017 by the indicator of life expectancy from 71.2 to 72.1 years. This level is below the national average. In 2003, a similar group included only eight regions with a life expectancy of 63.3—64.2 years.

The increase in this group by more than three times — by 17 regions — occurred both from the bottom and from the top. About half of the regions in this group (the republics of Udmurtia and Altai, Nenets Autonomous Okrug, the Yaroslavl, Arkhangelsk, Nizhny Novgorod, Kostroma, Murmansk, Ivanovo, Vologda, Vladimir and Tula oblasts) experienced an increase in life expectancy above the national average in 2003—2017. Nenets AO and the Altai Republic changed their ranking positions very much during this time; they moved into this group from the bottom group and skipped two intermediate groups at the same time. The Arkhangelsk, Kostroma, Ivanovo and Vologda

oblasts moved here from the group with low life expectancy, skipping one group. The Tula, Vladimir, Murmansk and Yaroslavl oblasts moved here from the group with life expectancy significantly below the national average. In 2003, the republics of Udmurtia and Sakha (Yakutia), as well as the Nizhny Novgorod and Sverdlovsk oblasts were still in the group of regions with the indicator below the national average.

At the same time, in the Sverdlovsk Oblast and the Republic of Sakha (Yakutia), as well as in the republics of Crimea and Bashkortostan, the Tomsk, Kaluga, Kursk, Samara, Orel, Novosibirsk, Chelyabinsk, Omsk and Bryansk oblasts, the increase in life expectancy for 2003–2017 is less than in Russia as a whole. The Kursk, Orel, Chelyabinsk, Tomsk, Kaluga and Bryansk oblasts moved into this group from the group of regions with the average Russian level. The Republic of Bashkortostan, the Omsk, Novosibirsk and Samara oblasts moved to this group from the group with a level above the national average, skipping the group with the national average level. And the Republic of Crimea, with the 4.2 years increase in the indicator for the period, moved here from the group of regions with a high level of life expectancy

Almost all regions in this group (except the Crimea and the Murmansk Oblast) are characterized by a noticeable lag in this indicator. But in many of them, for example in Yakutia, the Yaroslavl, Nizhny Novgorod, Kostroma, Vologda, Vladimir, Tula and Samara oblasts there is a slight lag in the indicator for men. In 2016, in the Crimea, the Murmansk, Ivanovo and Kaluga oblasts, it exceeds the urban indicator, which proves the absence of a fundamental difference between the city and the village and can be considered by other regions as a positive experience in addressing the issue of rural lag in life expectancy.

All Northern regions within this group (Yakutia, Nenets Autonomous Okrug, the Murmansk and Arkhangelsk oblasts), as well as the republics of Udmurtia, Bashkortostan and Altai, the Samara, Sverdlovsk, Chelyabinsk, Omsk and Tomsk oblasts are characterized by a high share of mortality from external causes. In 12 regions of the group, infant mortality exceeds the national average, while in the Republic of Altai, the Bryansk and Kostroma oblasts, Altai Krai and Bashkiria — this indicator is considerably high. Thus, in the regions of this group, significant reserves for further growth of life expectancy consist primarily in reducing the gender differentiation of the indicator, reducing the share of mortality from external causes and infant mortality rate.

5. *National average level of life expectancy*

In 12 constituent entities of the Russian Federation, life expectancy in 2017 was in the range of 72.2–73.2 years, which can be considered the average Russian level. In 2003, this group included 11 regions with life expectancy of 63.3 to 65.2 years.

With an almost constant number of regions, the group with the average Russian level of life expectancy has been almost completely updated (only one region out of 12 was in this group in 2003 and in 2017) by including regions both from the bottom and from the top. The number of regions that entered this group from the top is more significant. The Republic of Mari-El, the Ryazan, Kirov and especially Kaliningrad and Leningrad oblasts are characterized by a significant increase in the indicator for 2003–2017. The Kaliningrad and Leningrad oblasts rose to this group from the group with low life expectancy, having skipped two groups. The Republic of Mari-El, the Ryazan and Kirov oblasts moved into this group from the group with an indicator below the national average. In Chuvashia, the Tyumen, Voronezh, Rostov, Saratov, Lipetsk and Ulyanovsk oblasts, we

observe the increase in life expectancy from 6.7 to 7.6 years (with the Russian national average increase of 7.9 years). Of these, the Ulyanovsk Oblast in 2003 had the average Russian level of life expectancy. Chuvashia, the Tyumen, Voronezh, Saratov and Lipetsk oblasts worsened their positions during the period under consideration: they moved into this group from the group with an indicator above the national average. And the Rostov Oblast moved here from the group with a level significantly above average, skipping one group.

Regions of the group, except the Tyumen, Rostov, Saratov and Kaliningrad oblasts, are characterized by increased gender differences. More than half of them are characterized by a noticeable lag in the rural indicator. In the Ryazan, Voronezh, Saratov and Rostov oblasts, inter-settlement differences are lower than the average Russian level; and in the Leningrad Oblast, the ratio in 2016 is the opposite: the rural indicator exceeds the urban one. Chuvashia and Mari-El, the Voronezh, Tyumen, Leningrad and Kirov oblasts are characterized by a high proportion of external causes of death, representing a significant reserve for mortality reduction. In the Rostov Oblast, the infant mortality rate is significantly higher than the national average. Thus, in the regions of the group with the average Russian level of life expectancy, there are significant reserves for further growth, especially due to the alignment of gender differences and the increase in the rural indicator.

6. *Life expectancy above the national average*

In 2017, 13 Russia's constituent entities belonged to the group with the level of life expectancy from 73.2 to 74.1 years. In 2003, there were 14 regions with the indicator in the range of 65.3–66.2 years, which at that time was above the national average.

In the Astrakhan, Moscow and Tambov oblasts, the increase in life expectancy for 2003–2017 is greater than the national average. These regions have moved up to the considered group from the group of regions with the average Russian level of life expectancy. The Penza Oblast has the average Russian value of the growth rate. In 2003, like the Volgograd Oblast and the republics of Mordovia and Kalmykia, it belonged to the group of regions with life expectancy above the national average. The remaining six regions in this group worsened their positions during the period under consideration. Krasnodar Krai and Yamalo-Nenets Autonomous Okrug moved down to this group from the group with life expectancy significantly above average; the Belgorod Oblast, Adygea Republic and Khanty-Mansi Autonomous Okrug — from the group with a high level of life expectancy, the city of Sevastopol with the growth of 3.7 years — from the group with a very high level. As we can see, new regions moved to the group of regions with a life expectancy above the national average to a greater extent from the top, i.e. at the expense of a reduction in the growth rate of the indicator when it reached a high value.

The regions in this group are mainly characterized by a less noticeable lag in the indicator for men. Gender differentiation is greater than the national average only in the Republic of Mordovia and in the Penza and Tambov oblasts. In most regions, there is a slight lag in the rural indicator, and it exceeded the urban level in the Moscow Oblast, Krasnodar Krai and Sevastopol in 2016. But in the republics of Adygea and Mordovia, and in Khanty-Mansi and Yamalo-Nenets autonomous okrugs, life expectancy of the rural population is significantly lower than in urban areas. In Yamalo-Nenets and Khanty-Mansi autonomous okrugs, as well as in Kalmykia,

a significant reserve for further increase in life expectancy can be found in the decrease in mortality from external causes. The infant mortality rate exceeds the national average in the Astrakhan Oblast, in Adygea and in Yamalo-Nenets Autonomous Okrug.

7. *Life expectancy significantly above the national average*

In 2017, three Russian constituent entities belonged to the group of regions with the value of 74.2—75.1 years. In 2003, the group with life expectancy significantly higher than the national average included five regions with the indicator ranging from 66.3 to 67.2 years.

All regions in this group are characterized by an increase in life expectancy below the national average. Stavropol Krai in 2003 belonged to this group; the Republic of Tatarstan moved down to this group from the group with a high level of life expectancy of the population, the Chechen Republic — from the group with a very high level. That is, the replenishment of the group occurs from above due to the slowdown in the growth rate of life expectancy when high levels are reached. In Stavropol Krai and especially in Chechnya, gender differences are much smaller than in Russia as a whole, in Tatarstan — only slightly more. The difference between the city and the village in Tatarstan is at the average Russian level, in Stavropol Krai — slightly higher; the ratio is the opposite in the Chechen Republic: the indicator in rural areas in 2016 is significantly higher than the urban one. In all regions of the group, the proportion of mortality from external causes is below the national average. However, in Chechnya and especially in Stavropol Krai, the infant mortality rate is quite high. Thus, in the regions of this group there are obvious reserves for further increase in life expectancy: in Chechnya and in Stavropol Krai, the reserves include a decrease in the

mortality in children under 12 months of age, in Tatarstan — a reduction in the lag of the indicator for men.

8. *High level of life expectancy*

The group with a high level of life expectancy ranging from 75.2 to 76.1 years in 2017 includes four constituent entities of Russia. In 2003, six regions were included in the corresponding group, which covers territories with the indicator level in the range from 67.3 to 68.2 years.

Saint Petersburg had an increase in life expectancy above the national average and moved upward in this group from the group of regions with an indicator significantly higher than the national average. The Karachay-Cherkess Republic traditionally belongs to the group with a high level of life expectancy. Kabardino-Balkaria and North Ossetia-Alania moved down to this group in 2003—2017 from the group with a very high level.

All regions in this group have a relatively favorable level of gender differentiation of the indicator and the differences between the city and the village, especially in Kabardino-Balkaria (as for Saint Petersburg, there is no rural population there), the percentage of mortality from external causes is significantly lower. With the exception of Karachay-Cherkessia, the infant mortality rate is lower than the national average. But, despite the fact that the indicator for men is not lagging behind very much, the magnitude of gender differences still makes it possible to consider them as a significant reserve for increasing life expectancy.

9. *Very high level of life expectancy*

The group that is conditionally called "very high level of life expectancy" in 2017 included three RF constituent entities with the level of 76.2 years and above: Ingushetia, Moscow and Dagestan. In 2003, this group included seven regions with life expectancy of 68.3 years.

All three regions traditionally belong to this group. Even in 2003, they occupied the top three places in the rating of Russian regions in terms of life expectancy. Only Dagestan and Moscow changed places during the period under consideration, since Moscow is characterized by the average Russian level of growth, whereas the growth was below the national average in Dagestan, as in Ingushetia, in 2003–2017. Gender differentiation is favorable in all regions, virtually like in the industrialized countries where it ranges from 5 to 8 years and increases as compared to the difference caused by medical and genetic factors, due to a reduction in female mortality in terms of gender equality and the fact that most women receive regular medical supervision and service [31, p. 88]. But this group of territories also has reserves for the growth of the first order. In particular, all of them have an increased level of infant mortality, especially Dagestan and Ingushetia, and Dagestan also has a noticeable lag in the rural indicator.

Concluding our analysis of the changes in regional differentiation of life expectancy of Russians for 2003–2017 we summarize the existing reserves for the growth of the indicator due to the first-order factors in regions; it will allow us to identify groups of territories that require similar tasks to be addressed so as to increase the level of life expectancy further *(Tab. 3)*.

In 59 constituent entities of Russia, the excess of female life expectancy is higher than the national average, and this fact requires closer attention to the following issues:

Table 3. Regional reserves of growth of life expectancy due to the potential of factors of the first order in 2017

Growth reserves	Number of regions	Regions
Significant gender differentiation in life expectancy	59	Republics of Altai, Bashkortostan, Buryatia, Karelia, Komi, Mari-El, Mordovia, Sakha (Yakutia), Tatarstan, Udmurtia, Chuvashia and Khakassia; Altai, Zabaikalsky, Kamchatka, Krasnoyarsk, Perm, Primorsky and Khabarovsk krais; the Amur, Arkhangelsk, Bryansk, Vladimir, Vologda, Voronezh, Ivanovo, Irkutsk, Kaluga, Kemerovo, Kirov, Kostroma, Kurgan, Kursk, Leningrad, Lipetsk, Magadan, Nizhny Novgorod, Novgorod, Novosibirsk, Omsk, Orenburg, Orel, Penza, Pskov, Ryazan, Samara, Sakhalin, Sverdlovsk, Smolensk, Tambov, Tver, Tomsk, Tula, Ulyanovsk, Chelyabinsk and Yaroslavl oblasts, Nenets and Chukotka autonomous okrugs; the Jewish Autonomous Oblast
Significant lag in life expectancy of the rural population	47	Republics of Adygea, Altai, Bashkortostan, Buryatia, Dagestan, Karelia, Komi, Mari-El, Mordovia, Tatarstan, Tyva, Khakassia and Chuvashia; Altai, Zabaikalsky, Kamchatka, Krasnoyarsk, Perm, Primorsky, Stavropol and Khabarovsk krais; the Arkhangelsk, Bryansk, Irkutsk, Kaliningrad, Kirov, Kurgan, Kursk, Lipetsk, Magadan, Novosibirsk, Omsk, Orel, Pskov, Sakhalin, Sverdlovsk, Smolensk, Tomsk, Tyumen, Udmurt, Ulyanovsk and Chelyabinsk oblasts; Nenets, Khanty-Mansi, Chukotka and Yamalo-Nenets autonomous okrugs; the Jewish Autonomous Oblast
Large share of external causes of death in the structure of mortality due to causes	42	Republics of Altai, Bashkortostan, Buryatia, Komi, Kalmykia, Mari-El, Sakha (Yakutia), Tyva, Udmurtia, Khakassia and Chuvashia; Zabaikalsky, Kamchatka, Krasnoyarsk, Perm, Primorsky and Khabarovsk krais; the Amur, Arkhangelsk, Voronezh, Irkutsk, Kemerovo, Kirov, Kurgan, Leningrad, Magadan, Murmansk, Omsk, Orenburg, Penza, Pskov, Samara, Sakhalin, Sverdlovsk, Tomsk, Tyumen and Chelyabinsk oblasts, Nenets, Khanty-Mansi, Chukotka and Yamalo-Nenets autonomous okrugs, the Jewish Autonomous Oblast
High infant mortality rate	38	Republics of Adygea, Altai, Bashkortostan, Buryatia, Dagestan, Ingushetia, Karachay-Cherkessia, Karelia, Tyva and Chechen Republic; Altai, Zabaikalsky, Kamchatka, Krasnoyarsk, Primorsky, Stavropol and Khabarovsk krais; the Arkhangelsk, Astrakhan, Bryansk, Vologda, Irkutsk, Kemerovo, Kostroma, Novgorod, Omsk, Orenburg, Orel, Rostov, Smolensk, Tula, Chelyabinsk and Yaroslavl oblasts; Nenets, Chukotka and Yamalo-Nenets autonomous okrugs, the Jewish Autonomous Oblast; the city of Moscow

unhealthy lifestyle of men, especially in working age, gender differences in behavioral risk of industrial, domestic and road injuries, and prevention of risky behavior. In 47 regions, there is a significant lag in the rural indicator, suggesting that it is necessary to focus on improving sanitary and living conditions in rural areas, the living standards of rural residents and their access to quality medical services. Almost half of the regions (42) have a significant proportion of mortality from unnatural causes, which is based on both behavioral and environmental risk factors: unfavorable moral, psychological and criminal atmosphere, low standard of living and unhealthy lifestyle, insufficient level of safety of working conditions, recreation and movement. In 38 regions, the infant mortality rate remains high, depending both on the quality of healthcare and maternity services, and on the well-being in the lifestyle of people, in the development of marriage and family relations and family life. At the same time, 14 regions (the republics of Altai, Bashkortostan and Buryatia, Zabaikalsky, Kamchatka, Krasnoyarsk, Primorsky and Khabarovsk krais, the Arkhangelsk, Omsk and Chelyabinsk oblasts, Nenets and Chukotka Autonomous okrugs, the Jewish Autonomous Oblast) are included in all the groups; that is, they have all reserves of growth of the first order.

Conclusion

Thus, in the conditions of growing life expectancy of Russians there was a noticeable rapprochement of Russia's constituent entities and their consolidation to the average level. Regional convergence occurred at the expense of the extreme groups according to the level of the indicator, and primarily due to the fact that lagging regions improved their positions; it means that we find out a catching up

convergence of life expectancy in Russia in 2003—2017, this fact determines the scientific novelty of our study. It is obvious that for 2004—2017, the relatively easy-to-realize life expectancy reserves that are typical of low-income regions have been well used. And in regions with high life expectancy, further growth is already a very difficult task, since the possibilities of first-order factors, which are considered as the magnitude of gender differences, the difference between urban and rural indicators, the share of mortality from external causes of death and the level of infant mortality, have already been implemented considerably.

However, all the selected nine groups of Russian regions still have reserves to increase life expectancy, due to certain first-order growth factors. Obviously, regions with the most unfavorable level of the indicator have the largest reserves. But also in the group with very high life expectancy, the lag of the rural indicator and the value of infant mortality provide opportunities for further increase in life expectancy due to growth factors of the first order.

But even when the possibilities of factors of the first order are exhausted, there still remains the potential for increasing life expectancy determined by the increase in the standard of living and quality of life, reduction in social differentiation, increased motivation for healthy lifestyle, formation of responsible attitude of citizens of all ages to their health, prevention of major modifiable risk factors for chronic diseases, early detection and adequate treatment of identified diseases, development of and improving access to high-tech medicine, etc. Promotion and utilization of all reserves is an important condition for further growth of life expectancy of Russians.

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Self-Regulation of the Image of Labor in Young People's Cultural Space

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Abstract. The idea of the essence of labor is largely socio-cultural, i.e. it is conditioned by a connection with a certain type of culture. Therefore, this article looks into the socio-cultural approach to self-regulation of the image of labor. Self-regulation of the image of labor is investigated in connection with the cultural space of young people. With the help of theoretical positions of phenomenological sociology we substantiate the concept of socio-cultural foundation used by young people to create an image of labor; we describe the process of formation of cultural space, consider a role of different types of culture in the process of formation of the meanings that form the image and act as semantic basis of what young people expect from labor. This approach contributes to a more adequate understanding of how young people form their attitude toward labor and of the contradictions arising in this sphere of life. The way in which young people understand the meaning of labor forms a basis on which the image of labor is created. We substantiate the most significant features of the conditions for the formation of meanings, reflecting the following changes in social reality in modern society – social uncertainty, destruction of

normativity, and semantic hybridization. The construction of young people's new ideas about labor takes place through the contradictory interaction between traditional and modern semantic patterns. We use data of sociological studies to analyze the connection between various characteristics of the image of labor and types of culture; we also analyze the influence of terminal and instrumental values in the constructed image of labor on young people's attitude toward actual labor. The mechanism of self-regulation of the attitude toward labor is revealed as a process of realization of expectations, in trust or distrust toward labor. The role of moral and psychological state of young people in this process is shown. The analysis allows us to understand more deeply the features of self-regulation of the image of labor and its role in the formation of young people's attitude toward labor. We make conclusions about the changes in the image of labor in the direction of more flexible forms that often depend on the moral and psychological state of young people, which is manifested in their attitude toward labor. We show a connection between self-regulation models based on terminal and instrumental values of labor and "adaptive" and "spiritual" types of culture.

Key words: young people, labor, image of labor, self-regulation, cultural space, socio-cultural mechanism of self-regulation, meanings, terminal and instrumental values of labor, trust and distrust, expectations.

Introduction

Global social and economic changes affect the sphere of labor and significantly change the very space of labor activity. The labor market is changing, not just separate professions, but their entire blocks are disappearing; developments in the field of artificial intelligence can lead to the devaluation of the human labor but also increase the importance of the creativity of the person; the level of education is being raised; and there remained, however, a contradiction between the level of people's training and the new demands of a rapidly changing professional landscape. Is it possible to survive socially and professionally in these conditions? Who will be in demand and what is needed so that not to fall out of the professional field? How to integrate into current and future changes and how they will be regulated? Finally, the main question is: who is the main actor of regulation?

Regulation of life activity is largely self-regulation, which in modern conditions of uncertainty, emancipation and individualization increasingly dominates purposeful regulation. And although society, in the face of its institutions, opposes uncertainty in its own way, the young people themselves have the final say. Based on their ideas about successful life, status and prospects, they make their choice in the labor field, they design and regulate their labor strategies.

The labor biography of a modern young man is a series of acts of choice, which is a multi-level subjective self-regulation, based on the idea of the reality of labor relations, generalized images of labor and its various aspects. Conceptualized and emotionally experienced, often formed not from their own experience, but through the reflection of the experience of others, they become the basis of a generalized image of work and affect its value.

Ideas about work are formed in a certain cultural space in which the life activities of different groups of young people take place. It is filled with a variety of ideas, meanings, values, which, when they correlate with their expectations and receive confirmation or refutation, are embedded in the image of reality. Therefore, everything that happens to young people in the labor sphere can be viewed more generally as a semantic projection of culture.

The source of basic semantic constructions are archetypal images contained in culture and reflected in the collective unconscious [1]. As a product of the historical evolution of society, archetypes are reflected in folk art in the form of proverbs, sayings, epics, myths passed down from generation to generation. In the process of social interactions, they are transformed into conscious forms. Interacting with other elements of the mechanism of self-regulation (meaning-life values, types of culture, etc.), they become a common cultural basis for the formation of the image of work and set the foundations of semantic self-regulation.

The process of changing generations includes not only reproduction, but also a constant rethinking of experience, which is a source of young people's new ideas about work, and therefore other expectations. Constructed new meanings are nurtured by the very practice of youth interaction with modern social intermediaries, their contact with modern global culture. Tested in inter-subjective interactions, they also participate in the formation of the image of labor.

Inherited traditional and formed modern values are in a state that reflects the unity and struggle of opposites in the semantic field of the cultural space of youth. Being concretized in the clash of formal and informal norms, proclaimed institutional and group goals of labor activity, meaningful and utilitarian values, this contradiction defines the specifics of the cultural space of youth by defining the image of work.

Thus, the problem lies in the contradictions of the formation of young people's image of work in a changing cultural space. Based on this most general problem, the goal of our paper is to study features of self-regulation of the image of work in connection with the components of the cultural space of youth. For this purpose, we analyze the relationship of archetypes, life values, types of culture as basic elements of social and cultural mechanism of self-regulation and components of the cultural space of young people with an understanding of the meaning of work and its association with behavioral attitudes of youth.

Research methodology

In the course of theoretical substantiation of the mechanism of self-image of labor in the cultural space of youth we have relied on an understanding of the historical role of culture in shaping a specific personality type. Culture acts as the basis of the semantic content of young people's ideas about the images of reality, filling them with moral and ideological content.

Self-regulation, which manifests itself in the social construction and redesign of reality, in the modeling of individual biographies, in the development of new value orientations, in the choice of adequate forms of behavior, is considered in the phenomenological paradigm (A. Schutz). The formation of archetypal and mental components of culture in the collective unconscious, which is the result of the reproduction of past experience, is developed in the psychoanalytic paradigm (C. Jung).

In the paradigm of understanding sociology by M. Weber, two main models of attitude toward social reality are identified: traditional and modern. They reflect the specifics of forming ideas about the image of objects of reality. The traditional model is characterized mainly by conventional ideas based on everyday experience, rooted in everyday life. Formed historically, they are inherited from generation to generation. In the modern model, the attitude toward the objects of reality is based on a rational understanding of their characteristics as a means to achieve the goals of their own life.

The formation of meaning and the formation of the semantic field of cultural space were substantiated on the basis of the concepts of L.S. Vygotsky, A.N. Leontiev, D.A. Leontiev and others.

For empirical analysis, we use the results of three studies conducted by the Center for Youth Sociology of ISPR RAS under our guidance. The 2011 study was conducted among the population of the Russian Federation over the age of 18 in 13 regions of the Russian Federation, in 67 localities. 1,300 people were surveyed, the sample of young people aged 18–29 comprised 301 people. The 2014 survey was conducted among the population aged over 15 in 13 constituent entities of the Russian Federation, in 65 settlements. 1,459 people were surveyed. The sample of young people aged 15–29 was 401 people. The 2017 study was conducted in 7 regions of the Russian Federation, in 28 localities. The sample of young people aged 15–29 was 803 people.

Surveys were conducted by the Public Opinion Institute "Qualitas" under the leadership of N.A. Romanovich, using the method of personal interview at the place of residence of respondents.

1. Socio-cultural approach to self-regulation of the image of work

The mechanism of social regulation has two sides, one of which is connected with the purposeful regulatory activity of social institutions, and the other – with the processes of individual and group self-regulation. Self-regulation is understood as "activities aimed at preventing and overcoming emerging deviations from such a state of conditions of existence and ways of life, which the individual (group) accepts for themselves as due and expected" [2, p. 141].

Understood as the impact of individuals and groups on themselves and their life activities in order to realize their own social expectations, self-regulation is directly related to the independent construction of life strategies in key areas of life. In this capacity, self-regulation is a form of formation of youth subjectivity as the ability to "act as an active beginning (actor, creator) of social reality" [3, p. 146].

Self-regulation is based on constructed images of reality objects as a set of semantic *representations* of their essence, correlated with their own expectations of interaction with these objects. According to B.F. Lomov, "representation is not a shadow of sensations and perceptions, not their weakened duplicate, but a generalized image of objects and phenomena of objective reality" [4, p. 167].

The established ideas of significance, importance and accessibility determine the nature of the relationship to the objects of reality. The awareness of oneself as an active subject of one's own life activity is accompanied by the formation of an appropriate attitude toward the objects of reality and the spheres in which young people construct their life trajectories. Therefore, the relationship becomes an accumulator of *ideas about the essence* of objects of reality and the *possibilities* of realization of group and individual interests in the process of becoming their subjectivity. The attitude toward labor is manifested in the work expectations of young people, and expectations are reflected in the characteristics of the image of work they construct, as if filling them with their own meaning.

From the theoretical positions of phenomenology, the essence of meaning is revealed through the concept of "lifeworld" defined by A. Schutz as the world of human experience, in which "we, as human beings among their own kind, experience culture and society, depend on their objects that affect us and in turn are exposed to our influence" [5, p. 116]. Representing an individualized reflection of the actual relationship of the individual to the objects for which their activities are deployed, the personal meaning that is given to the objects of reality reflects its subjective images. The formation of the image is based on its meaning as a representation of the essence, without which, as S. Averintsev notes, "the image crumbles" [6, p. 387].

Using the concept of the semantic field in the study of the mechanism of semantic regulation of activity, L.S. Vygotsky emphasized the importance of a person's awareness of the actual situation of their behavior. When the situation is considered in the process of activity, the semantic field and the actions themselves can change [7, 8]. According to A.N. Leontiev, the "conscious meaning" that a person possesses, in turn, is mediated by the phenomenon of social consciousness and values as elements of this consciousness [9; 10]. Therefore, an important feature of personal meaning is the derivative of its content from the social position of a person in the system of social relations. A significant role in this process is played by the place of individuals and groups in the system of interactions in a particular area, the associated opportunities and limitations, the basis of stratification and the degree of inequality, the prospects for social mobility and the realization of expectations.

In the youth environment, the diversity of meanings is especially noticeable due to the deep social differentiation caused by the economic conditions of life in the regions, differences in the structure of production and the labor market, and dramatic gaps in the level of remuneration. These drivers of inequality are supplemented by motivational differences, in which social attitudes, expectations, individual and group perceptions of the standard of living and quality of life, and life values play an important role. In addition, in the process of comprehension, in addition to the intellectual processes of cognition of reality and its understanding, there is also an emotional component on the basis of which the experience arises. Young people use all this to construct the image of reality as a whole, including the image of work.

According to I.I. Kvasova, "the fundamental meaning of the concept of "meaning" is that it brings the explanation beyond the limits of individual consciousness, in the plane of the real life of the actor" [11, p. 35]. The meaning of labor defines the idea of labor in some integrity, linking it with a broader layer of reality. This determines the special role of meaning as a correlate of understanding, in which the ideal idea of work and its actual state converge. The young person's understanding of the meaning of work is not limited to the attitude toward a particular job. It is associated with many aspects of their life — with education, social status, career, relationships in the immediate environment, and lifestyle. Thus, the image of work is formed in the mind, in which the ideas about its essential characteristics are resulting in a generalized form on the basis of a significant and stable meaning (idea).

The nature and content of the meanings that young people give to the image they construct reflect historical experience and knowledge, mostly theoretical, accumulated in the culture, as well as everyday knowledge and experience contained in everyday interactions with the close environment. Inter-subjective interactions become a mechanism and at the same time a social space in which ideas circulate, meanings are formed and transmitted. Semantic patterns and social interactions arising from them are the basis for the formation of cultural space.

If social space is understood as a set of structured and ordered social positions, as a stage on which the interaction of social actors with different statuses unfolds [12; 13, p. 329], then cultural space is a set of ideas on the basis of which images are formed. The representation of social space as a set of social meanings allows us to identify common semantic formats of social life, forms of organization of everyday experience — "frames" [14; 15]. Based on this, the main elements of cultural space are cultural patterns that are formed and preserved in the collective unconscious in the form of archetypes and mental traits of national character, habitual attitudes and social practices formed on their

basis, as well as diverse forms of modern culture generated by global cross-cultural interactions. They are the basis of various types of culture and together form a socio-cultural environment for young people. In this sense, cultural space is "the space of realization of human virtuality (inclinations, opportunities, abilities, desires, etc.), implementation of social programs, goals and interests, dissemination of ideas and views, language and traditions, beliefs and norms, etc." [16, p. 39].

In the cultural space, the integration function of culture is realized, aimed at uniting young people who are committed to various types of culture. Manifesting itself in the self-identification of young people with the group and with their generation, cultural integration contributes to the objectification of the meanings underlying self-regulation of life. The meanings shared by others acquire a more reasonable form in the young individual's mind, giving them confidence in the correctness of the constructed image of reality.

The types of culture that make up the cultural space act as semantic bases in forming the corresponding expectations of young people in relation to work. Reflected in the characteristics of the constructed image of work, expectations are essentially a reference point with which a young person compares the real opportunities realized in work. Fulfilled expectations are manifested in the trust in labor as a social institution, which is positively reflected in labor motivation, labor mobility, and job satisfaction. The narrowing of opportunities to realize expectations in the field of labor, the formation of an image of labor as difficult, unprotected, alienated and meaningless reduces the trust and interest in labor with all the implications that follow.

Thus, the attitude of young people toward work is the result of individual and group construction and is formed on the basis of ideas about what work should be and what it is, based on current knowledge and life experience. Therefore, self-regulation is manifested in the construction of an image of work by young people, which is a reflection of its meaning, functions and their own perspectives in connection with work in the group and individual consciousness.

2. Changing reality as a condition for constructing the image of work

The formation of ideas about the work of modern youth takes place in a changing social reality. Numerous objects of social reality — social groups, communities, organizations, institutions, as well as objects that form the cultural space of life of young people, are in constant change. Inside them, some processes are continuously occurring, something changes under the influence of both internal (endogenous) and external (exogenous) factors. The constructed social reality changes accordingly.

In understanding the changes in social reality in a sociological sense, the emphasis is placed on the concept of "social". We are not referring to any changes occurring in society, but to the social causes and consequences of these changes, which are reflected in the ordinary consciousness of people in the process of their social interactions. That is, the basis of changes in social reality are social changes, which are understood as "various changes that occur over time in social communities, groups, institutions, organizations and societies, in their relationships with each other, as well as with individuals"[1]. Interacting with each other in changing structures of society and getting new knowledge about their real state, young people correct the existing images of objects of social reality undergoing change, and their attitude toward them (subjective reality).

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[1] Osipov G.V., Moskvichev L.N. *Sociology. Fundamentals of General Theory: Textbook*. Moscow: Aspekt Press, 1996. P. 317.

As noted, the change in subjective reality implies its reinterpretation, giving the past and present a different meaning. The emergence of new meanings leads to a change in the structure of social expectations. P. Berger and T. Luckmann call this process resocialization, in which "the past is reinterpreted so that it corresponds to the present reality" [17, p. 263]. Through resocialization, phenomenology explains the transformation of subjective reality and the specifics of its objectification in transitional conditions. Previous studies have shown quite convincingly how social reality is changing. First, by *changing the content of semantic meanings in traditionally existing forms*. Traditionally existing forms mean familiar concepts that are used in everyday life, but the meaning of which changes under the influence of new living and working conditions. The former understanding of them gives way to new meanings that change, in essence, their content. Second, *by rationalizing the ways to realize expectations that arise in the image of the object of reality*. Instead of the old ways of realizing expectations, new ones appear that are more rational from the point of view of optimizing the result (speed and quality) and are approved by a large part of young people [18, pp.185-189].

These processes are associated with more general trends as sources of life experience and representations as generalized images.

First of all, it is the acceleration of socio-economic change and the accompanying uncertainty. It manifests itself in the deconstruction of stable patterns, the blurring of structures and patterns of behavior, the absence of direct determinations between actions and expected results, the blurring of the line between the properties and states of structures such as the economy, the labor market, and professional groups, due to the increasing share of randomness in their functioning.

Such conditions prevent a young person from forming a clear picture of reality and making a meaningful choice of work strategy.

Uncertainty is directly related to the state of social regulation mechanisms – the weakening of their institutional foundations and the expansion of non-institutional ones, the shrinking of the space of purposeful regulation and the expansion of self-regulation. This means increasing the role of subjectivity of individuals and groups, and individual choice of young people, which is regulated by their own semantic structure, ideas about a successful life, career, professional achievements, status, etc. At the same time, it is necessary to take into account that the formation of several generations of young people takes place in the conditions of destruction of normativity and ambiguity of ideas about work and scenarios of work biography. Emerging new ideas and meanings are soft, polysemantic, and optional. Work is not a central element of life for everyone, and the understanding of its significance varies among different groups of young people. Therefore, social self-regulation is associated with the deconstruction of some semantic patterns of labor relations and the formation of new ones.

The changes in the meaning of work and in the mechanisms of its regulation have become a prerequisite for new forms of interaction in the labor sphere between the employee and the employer and within work teams, and naturally affected young people and the choice of forms of working life: from the desperate desire to be involved primarily in building a career, achieving a high professional status to escapism and downshifting [19, 20]. And the search for flexible ways of self-regulation of working life is the basis for the development of new forms of employment, including self-employment, freelancing, etc. [21, 22]; on the one hand, this expands the freedom to design labor strategies

and reflects the processes of emancipation as getting rid of strict institutional restrictions, and on the other hand significantly increases the risks. The flexibility of the labor market and its structural components has a downside in the form of employment instability — precarization [23; 24; 25; 26; 27], not protected by employment contracts and obligations, creating new uncertainty; to overcoming it means to get involved in individual and group slalom and surfing, the effectiveness of which in the absence of reliable forms of social protection is rather random. The spread of these practices on a mass scale reflects various ways of discrimination against young people, expands their socially vulnerable groups, and leads to their exclusion and marginalization. The reflection of these features of the state of labor relations in the minds of young people through their actual experience and knowledge expands the semantic picture of reality. Its correlation with one's own social expectations creates an ambiguous image of work and attitude toward it as an object of reality.

Reinterpretation and adding different meanings to work activity reflects the process of changing reality. At the same time, changing the images is a process of interiorization and construction of new meanings that takes place against the background of inertia and reproduction of the basic, traditional foundations of culture. Historically formed and recognizable features of the image of labor can be seen in the views of young people and create the phenomenon of hybridization as one of the most typical features of modern Russian society.

Thus, change is an immanent property of social reality, and the changing reality itself is reflected in the cultural space of young people in the formation of modern images and representations, i.e., meanings. In the situation of open reality, which is associated with the lack of sustainable social regulation and the need for

its individual construction, group experience and behavioral models tested by practice play a crucial role. At the same time, traditional semantic patterns coexist and reproduce, reflecting the inertia of historically determined cultural patterns that take their own place in the mechanism of self-regulation. This reality is marked by a constant updating of socio-cultural patterns, pluralism of norms and the permissibility of any of its configurations; "temporal dyschronosis", as well as the coexistence of different "time-worlds", when the normative representations of different groups are correlated with different types of social time [28]. Through their contradictory interaction, actual images of reality are built.

3. Sociocultural self-regulation of the image of work: empirical analysis

Based on the results of studies, we will analyze how self-regulation of the way of work is carried out by young people. Historically formed ideas about labor are contained in proverbs and sayings that preserve the archetypes of labor in the collective unconscious. The following question was asked: "Which of these proverbs is more appropriate to your life position?", and the following proverbs were analyzed, containing alternative ideas about the attitude to work: "He who would catch fish must not mind getting wet" or "Only fools and horses work", as well as "Idleness is the mother of all evil" or "Break a sweat while you are eating, get cold while you are working". The responses of young people in different age groups are presented in *Table 1*.

The choice of proverbs reflecting archetypes with a positive meaning of work from the proposed alternatives by the majority of respondents indicates the appropriate orientation of the image of work being constructed by young people. Their share increases as the age of respondents increases. At the same time, there is a fairly stable part of young people who agree

with proverbs that reflect the archetypes of negative attitudes toward work. Such archetypes of labor have historically been a consequence of the class nature of the attitude toward it. Physical labor was perceived as unworthy of a free person, and it was considered shameful to engage in it; this viewpoint is reflected in proverbs and in fiction. In modern conditions, the negative attitude toward work is filled with new meanings. Unprecedented stratification in terms of living standards contributed to the destruction of normativity as such and unambiguous ideas about labor biography as the only norm. Labor is no longer regarded as an absolute norm, and non-labor biography has ceased to be an unambiguous deviation. Therefore, the refusal to work becomes one of the options of the biography if it does not meet expectations. The "aristocratic fastidiousness" in relation to work, the idleness of the creative way of life, and the emergence of a subculture of exclusivity among young people – young people who defiantly despise social norms, including in relation to work – are again spreading.

Having chosen the proverbs "Only fools and horses work" and "Break a sweat while you are eating, get cold while you are working", almost one in five young people (17.6%) recognizes work as unworthy for themselves, and one in ten (12.7%) shows a dismissive attitude toward it. Accordingly, the various meanings that have been historically formed in the archetypes of labor, as well as their modern modernization, are reflected in the young people's understanding of its essence.

Understanding the essence of labor is revealed in the answers to the question "What is the meaning of labor to you?" The answers reflect the value attitude toward work. Work as a terminal value was defined by a set of semantic meanings: a sense of utility, inner need, creativity. And the instrumental attitude toward work was defined by a set of the following semantic meanings: the opportunity to earn, forced necessity, communication. Let us analyze the relationship of positively and negatively directed archetypes (the average values of the relationship for each proverb) with the value of labor *(Tab. 2)*.

The analysis of the table data shows, first, that the value of the terminal value of labor is more than twice higher in groups with a positive orientation of archetypes (26%) compared to groups with a negative orientation (11.2%). Terminal value is inherent in the traditional attitude toward labor, in which it is considered

Table 1. Archetypes of labor in the collective unconscious of youth

Age (years)	Distribution of answers to the question, % of respondents			
	He who would catch fish must not mind getting wet	Only fools and horses work	Idleness is the mother of all evil	Break a sweat while you are eating, get cold while you are working
15–17	77.8	22.2	87.3	12.7
18–24	83.7	16.3	87.4	12.6
25–29	85.8	14.2	87.2	12.8
Average	82.4	17.6	87.3	12.7
Source: compiled based on the results of a study conducted by the Center for Youth Sociology of ISPR RAS in 2011.				

Table 2. Connection of archetypes with the value of labor

Archetypes	Connection with the value of labor, % of respondents	
	Terminal value of labor	Instrumental value of labor
Positive orientation	26.0	74.0
Negative orientation	11.2	88.8
Source: compiled based on the results of a study conducted by the Center for Youth Sociology of ISPR RAS in 2011.		

primarily as a source of development of an individual's own spiritual and physical forces. And second, there is a clear trend of instrumentalization of labor in modern conditions. This trend reflects the influence of increasing dynamism, variability, and uncertainty in modern society. The labor market is changing, professions are being transformed, and the scale of professional prestige is being revised. In these conditions, the role of self-regulation of labor relations increases, and the instrumental attitude toward work becomes an important element in its mechanism.

Since the value attitude toward work has a socio-cultural nature, we analyze the relationship between the types of basic culture that form the cultural space of youth [29; 30, pp. 14-19], with the value of labor *(Tab. 3)*. The typologization of culture is based on the theory of social and cultural dynamics of P.A. Sorokin [31].

The data presented in the table show that all the analyzed types of culture are more closely related to the instrumental attitude of young people toward labor (average value = 60.1%) than to the terminal one (39.9%). To the greatest extent, the instrumental value of labor is associated with adaptive culture (the need to save in everything, adapt to changing conditions) – 68.8%, and the terminal value – with spiritual culture (47.4%). That is, when constructing the image of labor, the

semantic content of its characteristics (terminal or instrumental) is determined by the belonging of young people to a certain type of culture.

Historical experience and knowledge accumulated in different types of culture and in the characteristics of the image of labor they construct, serve as a semantic basis for the corresponding expectations from actual labor. In terms of significance, expectations were distributed as follows: to adapt to changing conditions; to satisfy one's spiritual needs; to provide a quiet comfortable life for oneself and one's family; to serve as a normative basis (meritocratic criterion) for social advancement; to realize one's own innovative potential; to satisfy the need for self-transformation and physical development. By means of expectations the constructed image of labor is connected with the process of life activity as a whole.

Let us consider to what extent the formation of young people's image of labor is connected with the meaning of their life. To do this, we will analyze the relationship between meaning-life values and the value attitude of young people toward labor *(Tab. 4)*.

These tables show the predominant relationship of the majority of meaning-life values with instrumental values in young people's image of work. Moreover, the most significant connections are traced with the following meanings of life: with political

Table 3. Relationship between basic culture types and the value of labor

Types of basic culture	Connection with the value of labor, in %	
	with terminal value	with instrumental value
Spiritual culture	47.4	52.6
Innovative culture	39.5	60.5
Physical development culture	44.4	55.6
Hedonistic culture	38.2	61.8
Adaptive culture	31.2	68.8
Culture of moral anomie	38.4	61.6
Average	39.9	60.1
Source: compiled based on the results of a study conducted by the Center for Youth Sociology of ISPR RAS in 2017.		

Table 4. Relationship between life values and the value of labor

Life values	Connection with the value of labor, in %	
	with terminal value	with instrumental value
Pursuit of truth	54.1	45.9
Love	45.1	54.9
Struggle for justice	50.9	49.1
Quiet comfortable life	33.6	66.4
Political struggle (for power)	28.1	71.9
Manifestation of one's individuality (self-realization)	47.0	53.0
Continuation of oneself in future generations	38.7	61.3
Source: compiled on the basis of the results of a study conducted by the Center for Youth Sociology of ISPR RAS in 2017.		

struggle (for power) — 71.9%; with a quiet comfortable life — 66.4%; with the continuation of oneself in future generations — 61.3%, and to a lesser extent — with love — 54.9% and with the manifestation of one's individuality (with self-realization) — 53%. Only the pursuit of truth and the struggle for justice, as meaning-life values, are more related to the terminal values in the image of work. That is, the instrumental attitude toward work as an opportunity to earn money, as a forced necessity, or as a communication reflects the corresponding understanding of the meaning of life by young people. Therefore, in the changing reality, more rational ideas of young people about the meaning of life are actualized, which is manifested in the instrumentalization of values in the image of work, and in the direction of their life activities.

To confirm this conclusion, we will analyze how labor values are related to the choice of life strategies and behaviors by young people *(Tab. 5)*.

Young people's preferences related to choosing life strategies were evaluated on a seven-point scale between the following

alternatives: change taken as a unit, and constancy taken as 7 points. In the choice of behavior models, the preference for extreme and risk was taken as a unit, and confidence and predictability — as 7 points.

It follows from the table that the proponents of both the terminal and instrumental value of labor prefer constancy in choosing a life strategy, as well as confidence and predictability in choosing a behavior model. Moreover, among the supporters of the instrumental value of labor, the estimates are much higher (K=5.39 and 5.08) than among the supporters of the terminal value (K=4.73 and 4.89). Therefore, the more significant desire of the proponents of the instrumental value of work for consistency and predictability in the choice of life strategy and behavior model confirms the conclusion about the rationalization of the youth environment and the attitude toward work and life in general.

Let us consider how the expectations contained in the constructed image of work are manifested in the attitude of young people toward their own work. The answers to the question about what working young people

Table 5. Relationship between the values of work and young people's life strategies and models of behavior*

Values of work	Relationship with life strategies (K)*	Relationship with models of behavior (K)
Terminal	4.73	4.89
Instrumental	5.39	5.08
*K – weighted average coefficient on a seven-point rating scale. Source: compiled based on the results of a study conducted by the Center for Youth Sociology of ISPR RAS in 2017.		

expect from work were distributed as follows: decent earnings – 77.5%, interesting creative work – 37.9%, professional self-realization – 37.3%, a sense of self-usefulness – 24.9%, providing basic means of existence – 15.5%, self-affirmation in the team – 18.4%, opportunities for entrepreneurial activity – 10.1%[2]. As can be seen, expectations were concretized in comparison with socio-cultural meanings in the constructed image of work, having taken the form of requirements for specific work.

Let us analyze how the expectations of labor (requirements for labor) are related to the attitude toward it *(Tab. 6)*.

Analysis of the data presented in the table shows that there is a stable relationship between work expectations of young people and their attitude toward work. The attitude toward work was evaluated based on the answers to the question "To what extent are these qualities inherent in the labor relations of representatives of your generation?" These qualities were interpreted as ethical standards of attitude toward work. The table shows the scores for the answer "inherent in full".

To the greatest extent, almost all the analyzed expectations are associated with a responsible attitude toward work (from 41.3 to 50%), which the majority of respondents, on the one hand, recognize as the highest level of their implementation, and on the other – as a priority condition for the implementation of expectations. This conclusion is confirmed by the high level of correlation between the following expectations from work: professional self-realization with mutual assistance (38%) and self-dedication in work (37.9%); interesting, creative work with a sense of freedom and independence from anyone (43.5%); opportunities for entrepreneurship with the principle of "every man for himself" (56.2%); self-affirmation in a team with mutual assistance (41%); decent earnings with hard work (38.4%) and with the principle of "every man for himself" (38%); a sense of self-usefulness with hard work (45%); providing basic means of existence with mutual assistance (44%).

Thus, the attitude of young people toward work depends on the degree of realization of

Table 6. Relationship of expectations from work (requirements for work) with ethical standards of attitude toward work

Expectations (requirements to work)	Ethical standards of attitude toward work, inherent in young people to the fullest extent, in %						
	Diligence	Mutual help	Responsibility	Thrift	The principle of every man for himself	Feeling of freedom	Dedication to work
Self-realization	9.8	38.0	41.3	27.3	36.4	29.8	37.9
Interesting work	37.1	37.9	48.4	32.3	39.5	43.5	35.5
Opportunity for entrepreneurship	34.4	34.4	50.0	37.5	56.2	40.6	34.4
Self-affirmation in the team	32.8	41.0	45.9	29.5	39.3	37.7	37.7
Decent earnings	38.4	33.6	44.4	28.4	38.0	35.6	34.0
Sense of self-usefulness	45.0	40.0	45.0	28.8	31.2	33.8	40.0
Providing basic means of existence	42.0	44.0	46.0	34.0	34.0	30.0	38.0
Source: compiled on the basis of the results of a study conducted by the Center for Youth Sociology of ISPR RAS in 2014.							

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[2] The sum is more than 100%, since not more than three possible answers were allowed.

expectations, which reflect the meanings contained in the characteristics of the image of work constructed by young people. The results of the study show that these expectations were fully realized only in 13.8% of cases, rather realized in 46.3%, rather not realized in 25.4%, not realized in 7.6% of cases, 6.9% of respondents found it difficult to answer. Consequently, one in three (32.9%) persons, whose expectations have not been fulfilled to varying degrees, tend not to trust labor.

Let us consider how distrust in labor arises and what role it plays in the analyzed process. The figurative form of reflection of the object of reality contains not only a rational understanding of its nature, but also an emotional attitude toward it. In the construction of the image of work, the content aspects of emotionality reflect the attitude toward its characteristics, which are of particular importance to the young person. By associating their expectations of work with them, they emotionally experience the possibility or impossibility of their realization. The fact how much unrealized expectations from work affect the social well-being of young people can be judged by the degree of their connection with the answers to the question "To what extent do the following feelings reflect your state over the past year?". The following distribution of relationships was obtained: with hope for improvement (66.2%), with confidence and safety (38.3%), with anxiety (30.9%), with indignation (30.8%), with confusion (20.6%), with fear and despair (17.7%), with indifference (16.3%)[3]. Although the majority of young people in a situation of unrealized expectations from work retain hope and confidence, a significant proportion of them experience feelings of anxiety, indignation, confusion, fear or indifference. That is, the resulting distrust of work is accompanied by significant changes in the social well-being of young people, which in turn affect their attitude toward work as a terminal or instrumental value.

Let us analyze how the nature of the relationship between the basic culture and the value of labor changes depending on the states of confidence and security, on the one hand, and fear and despair, on the other (*Tab. 7*).

From the analysis of the table data, the following trends become apparent. First, the presented average values of the terminal and instrumental values of labor, reflecting the relationship between different types of culture and young people's attitude toward specific work, significantly change in comparison with the average values of relations, reflecting

Table 7. Relation of basic culture types to the value of labor depending on young people's moral and psychological state

Types of basic culture	Value of labor depending on the state:			
	confidence and security, %		fear and despair, %	
	Terminal	Instrumental	Terminal	Instrumental
Spiritual culture	42.3	57.7	52.4	47.6
Innovative culture	43.8	56.2	56.0	44.0
Physical development culture	45.6	54.4	54.2	45.8
Hedonistic culture	44.4	55.6	51.0	49.0
Adaptive culture	39.8	60.2	57.1	42.9
Culture of moral anomie	41.4	58.6	55.0	45.0
Average	42.8	57.2	54.3	45.7
Source: compiled on the basis of the results of a study conducted by the Center for Youth Sociology of ISPR RAS in 2017.				

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[3] The sum is more than 100%, because the answers were evaluated for each analyzed feeling.

the constructed image of labor (see Tab. 3). Changes in the relationship between culture types and the value of work are particularly noticeable, depending on the state of fear and despair. In comparison with the image of labor, the average values of connection with terminal values increased from 39.9 to 54.3%, and with instrumental values decreased from 60.1 to 45.7%. Based on the socio-cultural approach, the attitude toward specific work, i.e. the work experience that a young person has, is evaluated on the basis of more general ideas about the essence of work as a phenomenon (generalized image). The correspondence of the expected characteristics of work and the real ones serves as a semantic basis for a positive attitude toward work, in fact, trust in work as the basis of life activity. And, on the contrary, mismatch between the expectations and the actual state of work becomes the basis for its negative image and distrust in it.

Second, all the analyzed types of basic culture, depending on the moral and psychological state of the respondents, change the direction of their influence on the value of labor. Moreover, due to the state of confidence and safety of the respondents, the scores of the instrumental value of labor (the average score = 57.2%) increase in comparison with the terminal value of labor (42.8%). And depending on the state of fear and despair of the respondents, on the contrary, the score of the terminal value of labor is higher than the instrumental value (the average score = 54.3% vs. 45.7%). That is, in the state of confidence and security, the modern rational attitude toward work is activated, and in a state of fear and despair, the traditional self-valuable attitude is activated.

A significant role in this dependence is played by trust or distrust of work, which can be judged by the nature of the relationship between the analyzed moral and psychological states of young people with the realization of expectations from work. Among young people who rated their condition as "confidence and security", expectations from work were not realized to varying degrees in 23.3% of cases, and in the opposite group — among those who rated their condition as "fear and despair" — 43.5% of expectations were unrealized, so the level of distrust of work is much higher.

It follows that the link between culture and young people's values related to work is mediated by a moral and psychological state that performs a significant regulatory function. On the one hand, it seems to compensate for the lack of activity of young people in a relatively prosperous state-confidence and security, affecting the increase in the importance of instrumental values. On the other hand, it makes up for the loss of certainty in a crisis state — fear and despair — by increasing the importance of terminal values.

In the self-regulation mechanism, this process looks like this. The analyzed types of basic culture reproduce both traditional terminal values and modern instrumental values in various spheres of young people's life, including work. This is reflected in the constructed image of work. In stable conditions that promote a sense of self-confidence and security in the youth environment, the importance of terminal values aimed at maintaining stability in the interactions of young people is weakening. Their influence is replaced by more rational modern instrumental values.

The opposite processes take place in conditions of uncertainty and risk in the youth environment, accompanied by a state of anxiety, indignation, fear and despair. Young people see the possibility of overcoming these conditions in a return to tradition, actualizing the influence of terminal values. Actualization of terminal or instrumental values in various

types of basic culture is carried out through reflection of the dominant moral and psychological states in the cultural space of various groups of young people.

Let us trace how the ratio of terminal and instrumental values in the image of youth labor has changed in recent years *(Tab. 8)*.

The tendency toward increasing the terminal value of labor reflects the change in the moral and psychological state of young people in connection with the declining standard of living in the country during this period. The reason was inefficient economic policy in the context of the crisis and sanctions, one of the consequences of which was low labor efficiency. Against the background of a general decline in wages, areas of employment with the highest remuneration are becoming scarce. In these conditions, young people begin to value any work that provides basic means of subsistence. The self-valuable, terminal attitude toward work increases.

Conclusion

Thus, in the emerging attitude toward work, presented through its image in young people's minds, internal contradictions are inherent. The image of work in the minds of young people simultaneously combines both positive and negative features. They are related to the historical features of social relations in the field of labor, labor practices, most of which have not been overcome. In modern conditions, they acquire a new aspect not only under the influence of changed expectations of young people, but also taking into account changes in specific life situations.

In self-regulation of labor relations, the instrumental attitude toward labor becomes a reflection of the state of uncertainty. Rationalization of labor, expressed in its instrumental meaning as a means of earning money, is the dominant feature of the image of youth labor. Meanwhile, it has become one of the basic features of the image of labor in the parent generation. Although this aspect of the image of labor is dominant in the labor sphere, it is not implemented in the labor practices of both the younger generation and older age groups, which is a significant factor in the devaluation of labor as such.

Despite the dominance of material aspects in the minds of young people, a significant role in the image of work is played by other parties associated with self-realization. However, only one in eight people can fully implement them in work practice. In the minds of modern youth, a stereotype of work is formed as uninteresting, unpromising, often heavy and meaningless, which has a devastating effect on ethical orientations, and on the moral and psychological state of youth.

Self-regulation of the image of labor takes flexible forms. A significant role in their choice is played by the moral and psychological state of young people, manifested in trust or distrust of work. Purposeful regulation of this process depends on the form of ownership, the type of production, the nature of work, and the conditions in various spheres of work. At the same time, the effectiveness of regulation is increased by stimulating the adaptation culture as the basis for the instrumental attitude of

Table 8. Change in the ratio of terminal and instrumental values of labor, 2011–2017

Year	Values of labor, %	
	Terminal	Instrumental
2011	23.8	76.2
2014	31.1	68.9
2017	39.7	60.3
Source: based on the results of three studies conducted by the Center for Youth Sociology of ISPR RAS in 2011, 2014 and 2017.		

young people toward work and spiritual culture as the basis for the formation of its terminal value, as well as a source of confidence, security and trust of young people.

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Formation of Scientific and Educational Values in the System of Youth Motivation*

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Abstract. The system of values is the "foundation" of the attitude toward the world. In the modern information society, the motivational and target component of work with the younger generation should lead to the formation of an "integrative profile" of an individual who possesses professional competencies

of a high level that are in demand in research and educational spheres, as well as in project activities. Motivation is largely determined not only by internal characteristics of an individual, but also by the ways in which activity is carried out; this activity in the process of its implementation should be targeted, directional, predictable and analytical, with monitoring, evaluation of efficiency and adjustment of its implementation, i.e. it should be conscious activity. Our goal is to identify new mechanisms of state stimulation of topical and priority areas of youth policy in the field of university science and identify possible routes for the development of values. We adhere to the basic idea of the need to take into account value orientations in the development of state youth policy. Desk research and sociological research were used as the main methods of the work. The desk study was conducted by analyzing the main directions of the state policy in the field of science and technology, normative legal acts of the Russian Federation, state programs and projects, and publications of international organizations. The study collected data on existing forms and measures of incentives and support for student youth. In order to test theoretical approaches to motivation and identification of the main factors contributing to youth participation in research activities, a sociological study was conducted among university students.

Introduction

The values formed by society represent the socially determined selective attitude of an individual toward the set of material and spiritual public goods. Values are ideas and goals formed by an individual and society.

Motivational values have a social meaning and are the object of activity. Considering the functions of the value, we can note their diversity: the landmark of an individual's life, the mechanism of social control. Considering motivational values of an individual, we can distinguish the following features: goals that are desirable to achieve; traces of specific situations; the evolution of an individual's behavior. Such characteristic features of values reflect, first, their cognitive elements ("knowledge", "beliefs"), and second, the activity-based foundations of their impact on the process of cognitive development. The value system of different generations may differ, especially if there is a change in socio-economic or socio-political conditions [1, 2, 3].

The youth of the 21st century is a generation that is radically different from the previous generations in history; it has access to all forms of information and high technological erudition. Representatives of this generation easily master technological innovations and can easily adjust their lives according to the requirements of the time; they actively and successfully work in various spheres, show initiative, creativity and leadership qualities. The ability to change in accordance with the imperatives of the new time allows Millennials to raise their motivational status significantly and successfully move on the path of new achievements. The current generation is the most important segment of society, designed to ensure its progress and development. The motivation of young people, including such components as aspirations, values, interests and actions, should be manifested in a gradual continuous movement toward the maximum implementation of potential [4].

Millennials or Generation Y includes those who were born between 1980 and 2000 and grew up during technological and economic turmoil. They will be the first generation to be worse off than their parents, but they are still expected to

take responsibility for the planet's problems, including aging populations, global debt and climate change. But the picture is not so bleak: young people will inherit a better world in many ways: there will be less poverty, health and education will become more accessible, there will be huge technological opportunities [5].

Millennials and Homelanders coming at their heels are the first generation of digital "natives": many of them do not remember life without the Internet. They are distinguished from previous generations by their mastery of the technologies that led us to the fourth industrial revolution [6]. Technology has not only shaped the way Millennials live and work, it has created a whole new set of beliefs, phobias, and aspirations. The values of young people, in turn, influence their approach to global challenges and opportunities. Generations Y and Z really want to make the world a better place – 84% consider it their duty, according to a Deloitte report, but they do not do it the way older generations do: they use the following three ways [7]:

– they work within existing systems; according to Deloitte research, more than 90% believe that business is a way to solve problems such as unemployment, and three-quarters believe that the problems of society should be solved by governments;

– they have effective tools at their disposal; in the world of digital communication, social media platforms allow young people to promote causes and find solutions to problems by directly holding institutions accountable;

– charity work is part of their way of life; they are also rational about the career they choose, attentive to the products they buy, and eager to spend their free time in an interesting and useful way.

However, the preferences of generations Y and Z differ. It is interesting to compare the results of a sociological survey conducted in 2009 in Russia by the Swiss Academy for Development [5a – Youth in Russia] among the representatives of Generation Y, and the results of a sociological survey we conducted among the first-year students in 2018, which was attended by 513 students from four universities in Moscow: Russian Presidential Academy of National Economy and Public Administration (RANEPA), State University of Management (SUM), MGIMO and Financial University under the Government of the Russian Federation *(Fig. 1)*.

But Homelanders are just getting ready to take jobs, and Millennials already make up 25% of the U.S. workforce and more than half of the population in India, and by 2020 they will make up 50% of the world's workforce. Millennials differ from other generations in how they behave in the workplace: they are the first generation to better understand the Internet as a business tool than their managers. But it is not just how they use technology. Today's young people want to see a different management style and a different corporate culture: they expect rapid progress, want their careers to be diverse and interesting, and believe that feedback should be constant. Today's young people also want to feel that their work has value and that their efforts are recognized; they also value this in the employer and consumer. If they feel that their expectations are not met, they quickly leave for another job.

The main values of the generation of Millennials and Homelanders [9, 10] can be combined into the following categories:

• academic success: admission to the university, successful completion of education, obtaining a diploma, career growth;

• presence of leadership qualities: responsibility, potential opportunities, ability to develop self-sufficiently;

• behavior in society: ability to work in a team, healthy lifestyle, respectful attitude;

• high living standards: diverse interests, sense of justice, integrity.

Figure 1. Key factors that determine the choice of employment for young people (data are given in %)
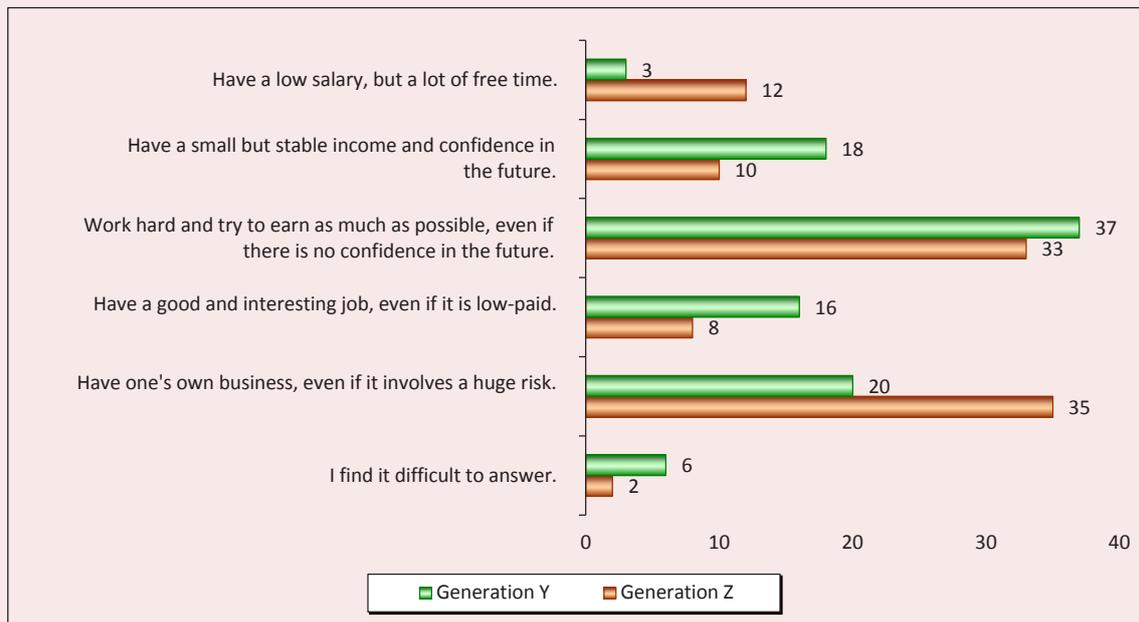
Source: own compilation on the basis of a sociological survey and [8, p. 22].

Our main hypothesis is as follows*:* personal values are the basis for determining the goals of training young people, as well as one of the factors in the formation of the scientific and innovative environment in the university. Values are manifested in the consciousness of the student's personality in the form of personalized and general worldview guidelines, defining strategically important life goals. There is a close relationship between value orientations and the type of motivation. Motivational development and training as a phenomenon of development of scientific and educational values is activated under the influence of external and internal incentives, while the ratio of internal and external motivation may vary.

Theoretical approaches and literature analysis

Internal motivational factors that determine the development and learning process of most students determine their participation (desire to participate), curiosity (desire to learn more in the field of interest), response to challenges (assessment of the complexity of the problem) and social interaction (creating social connections). External motivation focuses on the desire to meet established requirements or expectations; to achieve recognition (to be publicly recognized); to participate on a competitive basis. External motivation generates the need to protect oneself from unnecessary work. Students with extrinsic motivation rely solely on reward and/or achievement of desired results, such as a certain number of test scores or a desired average score [11]. Students with external motivation are at greater risk of reducing their academic performance than students with internal motivation [12].

Learning and development based on internal motivation, that is, personal interest and curiosity, is more successful and productive. The development of a person's cognitive abilities, activated by unexpected, unfamiliar, interesting stimuli, focuses on the study of the world and phenomena, rather than receiving recognition, evaluation, or under the influence of external stimulation aimed at obtaining

the desired behavioral response. Intrinsic motivation activates a person's cognitive abilities and is thus important for personal development. In particular, the desire and willingness to cope with problematic situations, to be competent and effective within their society ensure the continuity of the cognitive process and determine the degree of positive behavioral changes. Internal motivational factors greatly contribute to the expansion of competencies in a particular field or discipline. The concept of intrinsic motivation includes self-interest in the subject, intrinsic reward, and cognitive and emotional satisfaction. Intrinsic motivation encourages participation in consciously chosen research and social activities for the purpose of emotional and intellectual satisfaction. In fact, an internally motivated student can deliberately choose and study complex questions, expanding their knowledge and experience without external training [13].

It should be noted that the impact of external rewards on internal motivation continues to be a subject of debate. External rewards can be an important tool for motivating academic behavior, but some argue that such rewards have a detrimental effect on internal motivation, which directs the student toward perseverance in achieving results [14].

It should be emphasized that academic education is aimed at teaching students the skills of scientific research and is most often implemented in the format of group or collective work, which implies certain obligations of the individual to the team.

However, despite the fact that group and collective work occupy a significant time share of training, according to some authors, the principles of individualism, which are not focused on maintaining the pre-existing imperative obligations of duty fulfillment, come to the fore in the system of values of modern man. As a result, the ideas of collectivism lose their effectiveness in shaping the motivation of young people. "The logic of individualism, individualistic, pragmatic spirit leads to the renunciation of the principle of autonomy in favor of the principle of independence" [15]. Indeed, today's society provides great opportunities for the development of human individuality, but it also turns out that the "individualized" modern man ceases to identify himself with the collective forms of identity — "We-identity".

Changing motivational value orientations of young people reflects the perception of not only systematically deformed external influence, but also its strategic and tactical impact on the inner world of the individual. Building a complete hierarchy of goals makes it possible to form conceptually an individual's personality, predict the direction of their activities and define it as an organic part of the collective identity at a certain level of social development. The formation of value orientations develops the ability to make volitional efforts and the activity of the life position in achieving the goal. Conversely, the underdevelopment of value orientations allows external stimuli to dominate the internal structure of the individual, which creates inconsistency in behavior and decision-making among young people. At the state level, in recent years, a number of important legislative acts have been adopted that contribute to rethinking the problems that determine the formation of the personality of a modern young person in the context of socio-economic changes *(Fig. 2)*.

Analysis of mechanisms of motivation of young people. Encouraging the motivation to learn and participate in research is one of the main principles of effective higher education [12]. If students are motivated internally, then they take part in research to achieve their own scientific and personal goals.

Figure 2. Legislative acts on scientific activities and youth policy in the Russian Federation (own compilation)
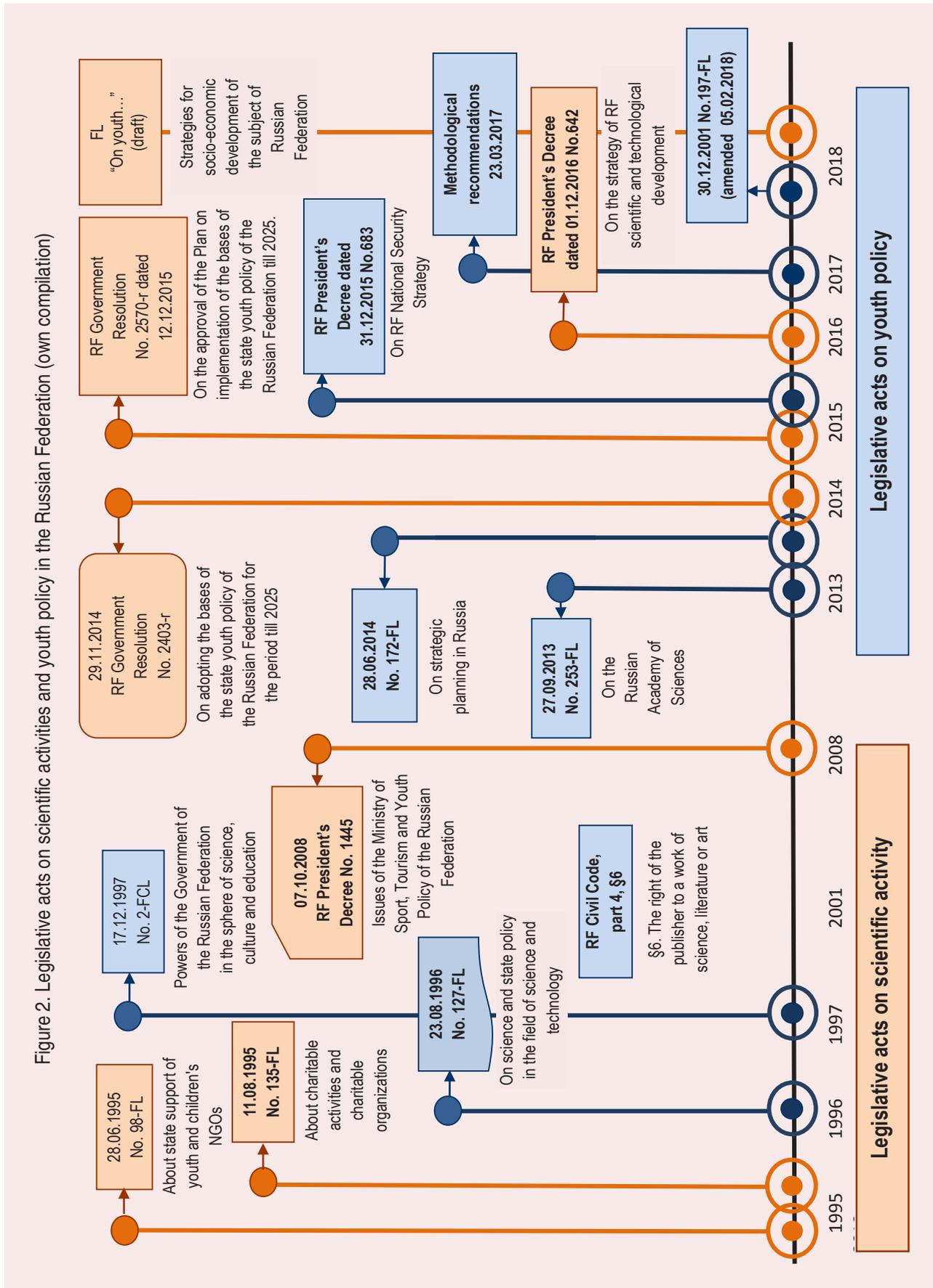
Internally motivated students like to use strategies that are more aggressive and that allow them to process information more intensively. It is very important for them to maintain and satisfy one of the main innate psychological needs – competence, which is associated with a sense of their effectiveness in interacting with the environment and the ability to implement their abilities [16]. Students with external motivation tend to make the least amount of effort necessary to get the most reward. Consequently, the more the social environment satisfies psychological needs, the more positive the consequences for internal motivation.

On the other hand, according to the theory of self-determination, people have a natural tendency toward psychological growth and integration [17]. This tendency is a function of the social context in which individuals develop, and the ability of this context to support and satisfy three innate psychological needs: autonomy, competence, and kinship. Autonomy refers to "the need to experience a sense of choice and, as a consequence, will" [18, 19]. Competence is related to the sense of one's effectiveness in interacting with the environment and the ability to implement one's abilities. Kinship refers to the quality of interpersonal relationships, to the "need to be close, trust, and care for others" [18]. No matter what motivational model is involved, the more the social environment meets the psychological needs, the more positive the consequences are.

Autonomous regulation occurs when people realize that their behavior and goals are the result of their own will and choice. In contrast, controlled regulation refers to actions that are aimed at seeking reward or recognition from others, or at avoiding punishment, guilt, or shame. Empirical evidence supports the argument that when psychological needs are met, people experience greater autonomous motivation and less controlled motivation. In addition, autonomous regulation is associated with positive results, while controlled motivation is associated with negative results [20]. In a study conducted to test the motivation scale for completing a PhD [21], autonomous regulation was positively associated with satisfaction (university, program, and research), positive influence, performance, and postdoctoral intentions, and negatively associated with test anxiety, negative influence, dropout intentions, and dissertation problems. Conversely, controlled regulation was positively associated with the above-mentioned negative outcomes, but negatively with most positive outcomes.

Similarly, it has been demonstrated that academic persistence in graduate students was predicted primarily by autonomous regulation [22]. Autonomous regulation was also associated with persistence in undergraduates [23] and high school students [24], while controlled regulation was negatively associated with persistence.

In addition to autonomous regulation, perceived competence is a central concept in other theories [25]. In the master's degree courses, students perceive the formation of academic competencies as a demonstration of perseverance [26], while doctoral research competencies were associated with research performance (for example, the number of articles, conferences, presentations) [22].

If we sum up the above, it becomes clear that the basis for the development of mechanisms of motivation of the youth policy is formed by the model of motivation theory X, Y, Z. The model of theory X is based on external control, the model of theory Y – on self-control, self motivation in the achievement of high results; and the model of theory Z is based on the principles of collective motivation.

And, although all of them are devoted to the principles and settings of the use of three different management systems that take into account different behavioral types, it should be noted that the general in all theories is a certain vector: goal – expectation-motivation (reward). The results depend on several regulators of problem solving: the effort spent, the personal qualities of the individual and their awareness of their role in the implementation of the action. The degree of effort spent depends on parameters such as the value of the reward, the relationship between effort and reward, and satisfaction with the performance of the work. Satisfaction is an indicator of how well the reward is perceived by the individual in comparison with the effort expended. Let us consider the mechanisms for stimulating youth in the implementation of the state youth policy.

The macroeconomic mechanism involves stimulating the development of scientific and innovative outlook in the school–university–labor market system and the formation of a motivational and information environment in society, as well as the formation and development of the status of a teacher – researcher, scientist in society. The macroeconomic mechanism implies the implementation of research and investment activities at the state level *(Fig. 3)*.

Mechanisms for stimulating young people in priority areas are as follows:
• active use of mass media to recognize the importance of the role of state youth policy for the socio-economic development of the country;
• development and adoption of an appropriate legislative and regulatory framework for the management of youth policy through the legislative bodies of state power at all levels;
• creation of funds and activation of civil society institutions engaged in the promotion and implementation of state youth policy;
• creation of the all-Russian system of youth media and information resources in the sphere of education with the participation of young people;

Figure 3. Macroeconomic mechanism for state stimulation of youth in priority areas [27]
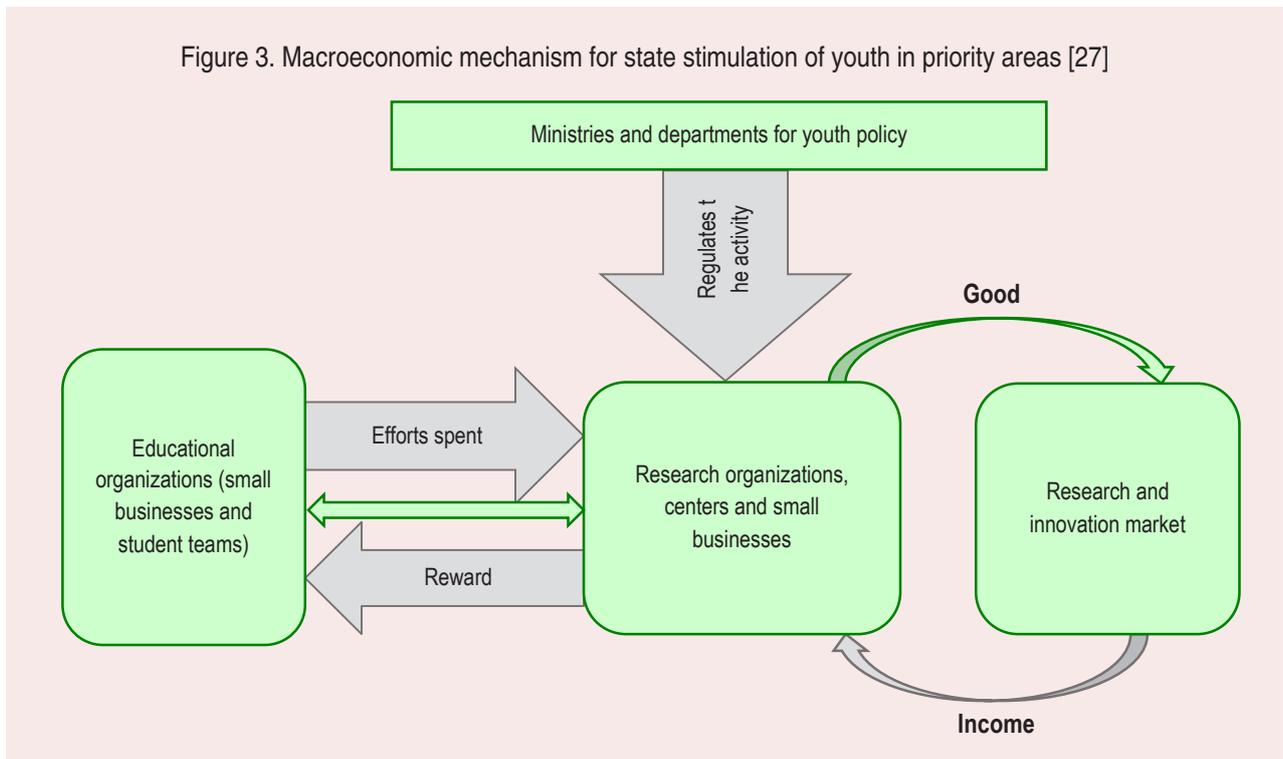
• development of network cooperation in the field of R&D "school-university-project", involving graduate students, students and schoolchildren in the implementation of real projects at the legislative level;

• development of programs "Affordable housing to young scientists" at the federal level through concessional lending and mortgages.

The microeconomic mechanism assumes stimulation of development of scientific and innovative outlook by means of educational process and formation of the motivational and information environment in the educational organization.

The microeconomic mechanism of state incentives for current and priority areas in youth policy is based on genuine recognition and encouragement of those participants who have conducted practical or applied research at a high scientific level and received valid results *(Fig. 4)*.

Both microeconomic and macroeconomic incentive mechanisms will function only if the rules and established procedures that are known to the participants act as regulators for solving the problems that research groups (organizations) are facing.

If we attempt a mathematical description of this mechanism, it will look like a definition of the motivation function depending on the reward and action.

The model situation can be presented in such a way that scientific organizations initially determine the forms of incentives, which can be expressed by the function $S(n_i)_i$ M, which belongs to the admissible set M, which, in turn, has its own restrictive parameters that depend on legal norms and economic efficiency indicators. A participant in a scientific project has the right to choose to perform certain actions n_i A that belong to the entire set of permissible actions A, from which this choice is made. Objectively

Figure 4. Microeconomic mechanism of state stimulation of youth in topical areas (own elaboration)
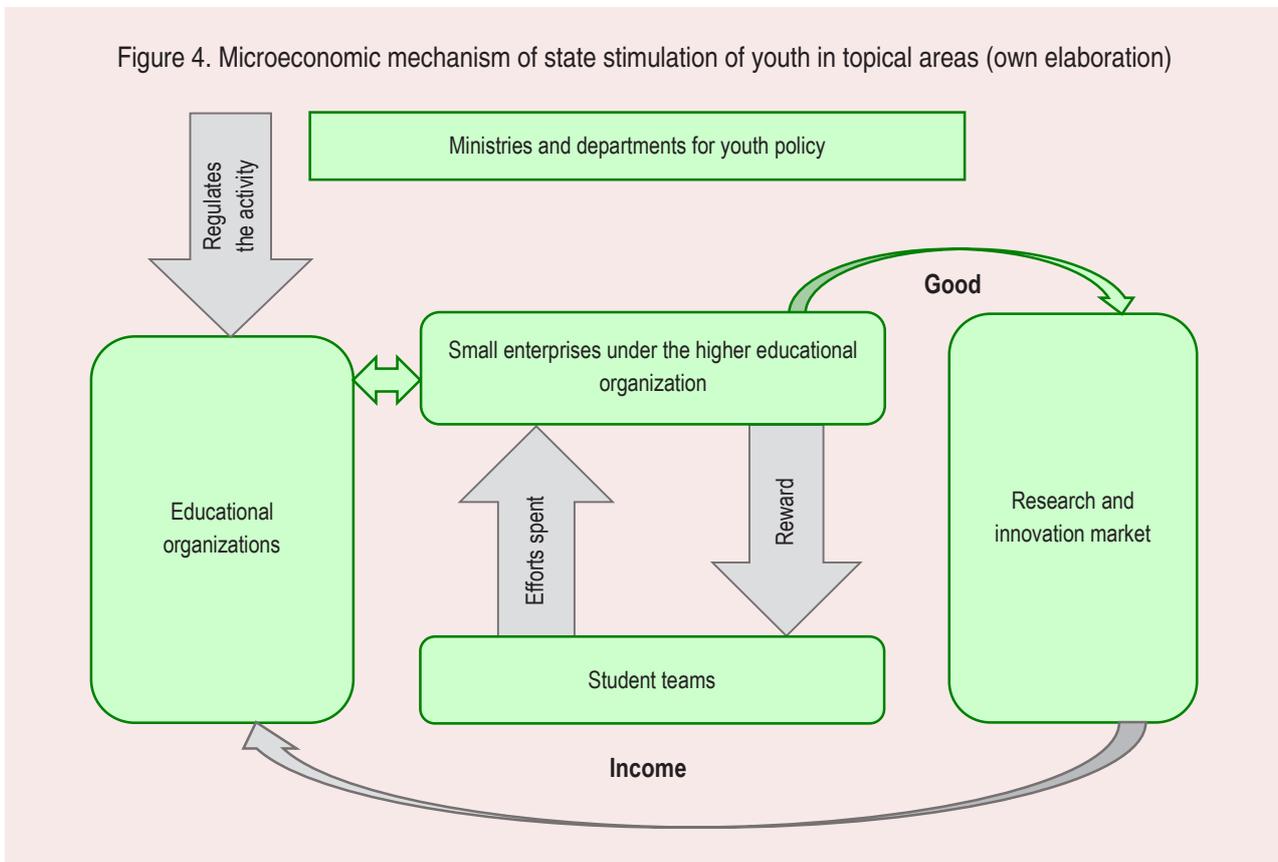
implementing the choice in practice to achieve the goal will require the participant to make certain efforts $G(n)$ to fulfill the obligations assumed. Successful implementation of the project with a positive financial interpretation of the results should bring income $D(n_i)$ to the scientific organization.

Expectations from both sides can be expressed by target functions, and also the utility function $\mathcal{D}(S(n_i)$ can be introduced, which acts as a criterion for the value of remuneration for the project participant:

– expectations of the scientific organization $F(n_i) = D(n_i) - S(n_i)$ (1);

– expectations of the participant $f(n_i) = S(n_i) - G(n_i)$ (2);

– utility of remuneration $f(n_i) = \mathcal{D}(S(n_i)) - G(n_i)$ (3)

The principle of action of the mechanism of motivation in the formation of individual values can be determined by taking as a basis the method of studying optimal strategies in game theory. If we consider the macroeconomic mechanism of state incentives for youth, the fundamental point is the treaty between the research team and educational organization; the member of the team receives maximum information about the existing criterion functions and admissible sets, and the scientific organization is self-determined in the choice of a stimulating function. When making a decision to perform the work stipulated in the contract, the project participant chooses the action that maximizes their target function. On the other hand, the procedure of the work of the scientific organization implies that it must choose the most effective way to stimulate the work of

Figure 5. Formation and stimulation of the development of scientific and innovative worldview in the school–university–labor market system (own elaboration)
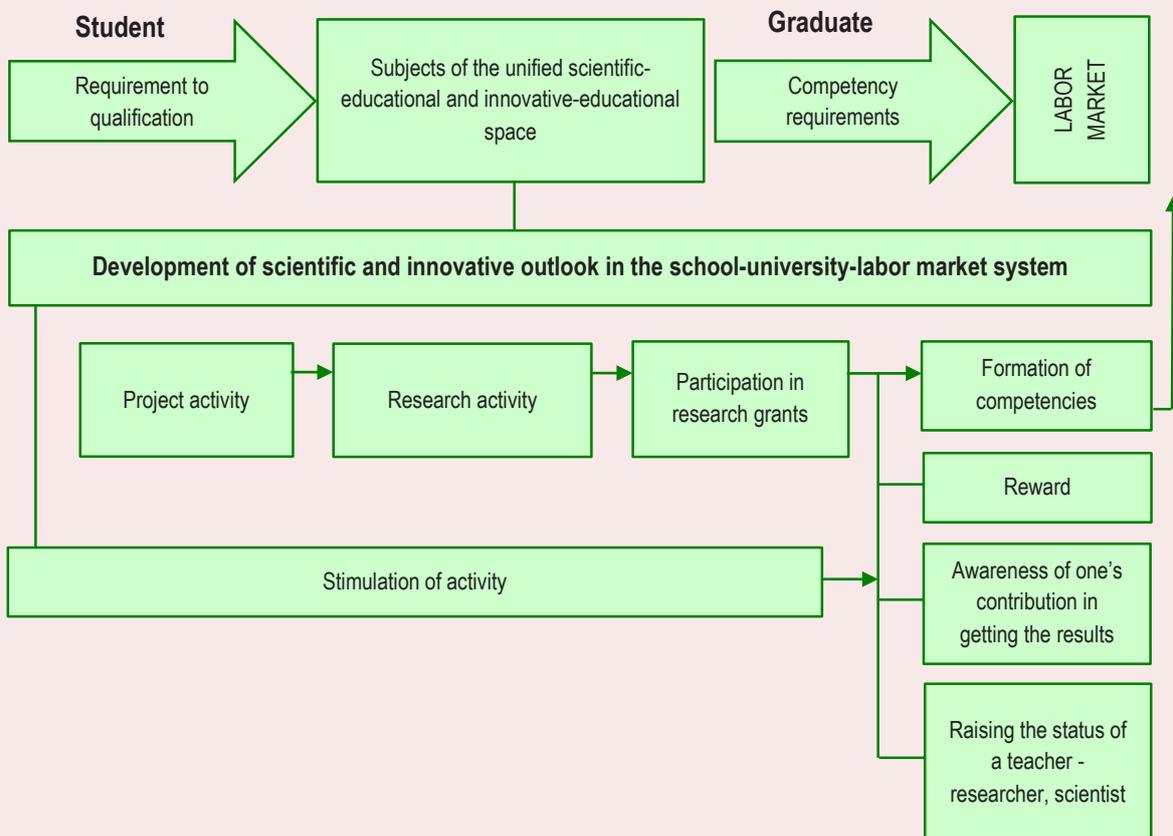
scientists in order to obtain the most effective result, which can be defined as $€_6 (S) = \max F(n_i)$; guaranteed efficiency is defined as (min) of this function, depending on the choice of actions.

Mechanisms for the formation of the system of values of youth. The problem of formation of values of modern youth needs to be solved in several aspects simultaneously.

1. Formation and stimulation of development of scientific and innovative outlook in the school-university-labor market system.

This motivational process can be implemented primarily by supporting talented young people in the field of research and innovation at all stages of the formation of an individual scientific and educational trajectory and ensuring the continuity of the specified trajectory, provided that the goal is achieved at each clearly defined stage *(Fig. 5)*.

The route for movement and the incentive mechanisms in the formation of the scientific and innovative worldview in the school-university-labor market system makes it possible to build an individual trajectory in determining goals and opportunities to achieve the desired results in scientific and educational innovation. In this process, of all the possible methods for solving problems, the most effective one is that focuses on the personal development potential of an individual, their desire to change things for the better, and significant support for the environment. The importance in the development of scientific and innovative outlook in the school-university-labor market system is to inform the scientific-minded youth in a timely manner, to consult them to obtain the maximum possible results of R&D, student R&D, and R&D and innovation work of youth. An analysis of the structural links that contribute to the motivation and promotion of young people in the field of research and development is presented in *Appendix 1.*

The procedure of actions formed by law in the scientific-educational and innovative process provides an opportunity to create routes for the formation of professional competencies in the labor market for each stage of the educational trajectory.

2. Formation of motivational and information environment in society.

Currently, the mass media have a huge impact on the formation of the worldview and perception of young people and the definition of life values of the younger generation.

Encouraging young people to participate in scientific activities is an important and real task that can be carried out with the help of the mass media. *Appendix 2* presents our own vision of the formation of scientific and innovative worldview of young people in the field of priority areas on the basis of activities carried out in the media, the Internet and social networks, indicating the incentive mechanism.

3. Formation and development of the status of a teacher-researcher, scientist (material and non-material aspects) in society.

The prestige of the profession of scientific and pedagogical worker is based on the attitude of society and the state toward higher education, and evaluation of its effectiveness. Internal assessment is formed by the educational environment of the higher educational organization, including the assessment of the teacher by students and expert assessment of the professional community of teachers. It is formed mainly by the following indicators: the level of pedagogical skill, teacher culture, creativity and erudition in the professional field, personal qualities, and communication. External assessment of the prestige of a higher school professor is formed with the participation of society and the state and depends on the strategic priorities of the country's educational policy.

Conclusions

The problem of attracting young people to science requires clarified criteria for assessing the ability of students to carry out scientific work and research. In our opinion, the main criteria at the first stage are as follows: the desire to participate in research, a high level of erudition, the general level of culture; willingness to work in a team, responsibility, communication skills, participation in the life of an educational organization.

It is also necessary to form an assessment of the degree of motivation of young people toward research and development. At the first stage, the supervisor must assess the degree of motivation of school students to project and research activities. Motivation is assessed through interviews at the first level, testing at the second level, and project implementation and defending at the third level.

The initial motivation for R&D is based on the process of interaction of students with the supervisor and from the first steps should be aimed at the formation of their value-motivational attitudes toward the profession, the development of competencies and creative abilities as young researchers. At the second stage, the process of interaction between the student and the R&D supervisor is built; here it is necessary to assess the knowledge and skills of the student to solve the tasks and scientific problems.

In order to adapt to Russian conditions, it is useful to consider the experience of foreign countries where funding is provided through the involvement of sponsors and benefactors [28]. The promotion of a culture of mentoring and charity for the development of science and technology among young people will be an important step in the reorganization of the education system in the Russian Federation.

In the context of reduced budget expenditures on education, the reallocation of expenditures on the development of science and technology in the framework of youth policy with the focus on non-profit organizations will increase the interest of the younger generation in education, and the benefactors and sponsors themselves in attracting talented representatives of educational institutions to develop innovative projects.

4. In order to develop science, technology and innovation among young people and to involve them in ongoing youth policy projects, it is necessary to ensure the openness and availability of information about the events. In the Russian Federation, a single information space that contains data on youth policy activities, including those in the field of science and technology, has not yet been formed.

5. The mechanism for the formation of motivation of students to understand and accept the values of the scientific and educational ecosystem should include the following components:

— fundamental values of the teaching staff;
— fundamental values of the students;
— fundamental values of the educational institution;
— fundamental values of the interested parties.

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Appendix 1

Structural links that contribute to the motivation and promotion of young people in the field of R&D and student R&D

Stage of the trajectory	Areas of activity	Target motivation	Structural links
Doctoral candidate	Scientific, technological and research activity	Involvement of doctoral candidates in positions in the fields of education and science, management of educational organizations	Rector – vice-rector for education – vice-rector for science
		Development of personal creative abilities	Department of post-graduate and doctoral studies – research department –teams at research institutes, research centers, business centers, small enterprises
		Individual support in research work, and organization of work according to individual training plans	Department of post-graduate and doctoral studies – research department –teams at research institutes, research centers, business centers, small enterprises – Doctoral candidate
PhD candidate	Scientific, technological and research activity	Implementation of continuity of progress	Department of post-graduate and doctoral studies
		Involvement of post-graduate students in the fields of education and science, management of educational organizations	Small innovation enterprises
		Development of personal creative abilities	Department of post-graduate and doctoral studies – research department –teams at research institutes, research centers, business centers, small enterprises
		Individual support in research work, and organization of work according to individual training plans	Department of post-graduate and doctoral studies – research department –teams at research institutes, research centers, business centers, small enterprises – Doctoral candidate
Master's degree student	Research work	Implementation of continuity of progress	Scientific-educational and innovative divisions of institutes, faculties, departments – research divisions of students and young scientists – teams at research institutes, research centers, business centers, small enterprises – department of post-graduate and doctoral studies
		Development of personal creative abilities	Scientific-educational and innovative divisions of institutes, faculties, departments – research divisions of students and young scientists – teams at research institutes, research centers, business centers, small enterprises
		Involvement in research work, individual support in research work	Research department – teams at research institutes, research centers, business centers, small enterprises – post-graduate student

End of Appendix 1

Stage of the trajectory	Areas of activity	Target motivation	Structural links
Bachelor's degree student	Research work	Selection of talented students and their involvement in research work	Departments, faculties, institutes – research department – teams at research institutes, research centers, business centers, small enterprises
		Development of personal creative abilities	Scientific-educational and innovative divisions of institutes, faculties, departments – research divisions of students and young scientists – teams at research institutes, research centers, business centers, small enterprises
		Implementation of continuity of progress	Scientific-educational and innovative divisions of institutes, faculties, departments – research divisions of students and young scientists – teams at research institutes, research centers, business centers, small enterprises – Master's degree courses
		Involvement in research work, individual support in research work	Research department – teams at research institutes, research centers, business centers, small enterprises – Master's degree student
		Defense of the graduation paper and the implementation of proposals in research activity and innovation	Higher Attestation Commission – All-Russian Attestation Commission – post-graduate and doctoral studies– – teams at research institutes, research centers, business centers, small enterprises
School student (high school graduate)		Selection of talented school students and their involvement in research work	School (project activity) – departments (career guidance through research work) – research department – teams at research institutes, research centers, business centers, small enterprises (involvement through excursions and participation in the project activity competition)
		Implementation of continuity of progress	Project activity at school – Scientific-educational and innovative divisions of institutes, faculties, departments – research divisions of students and young scientists – teams at research institutes, research centers, business centers, small enterprises – Bachelor's degree courses
Source: own elaboration.			

Appendix 2

Formation of scientific and innovative outlook of young people in the field of priority areas

Stages of transition	Events in the media, Internet and social networks	Stimulation mechanism
School student	- Use of social networks to disseminate information about the successful life (material and moral) of Russian scientists; - Conducting interactive activities on scientific topics at school with parents and children; - Dissemination of information in the media, the Internet and social networks about the state's attention to the development of science, material/moral incentives for scientists, housing issues, jobs and high international wages; - Implementation of grants for project activities for school students who show good performance results; - Individual support and consultation of scientists on the project carried out by the student through scientific websites; - Creation of scientific websites	- Formation of scientific worldview; - Formation of competencies in project and research activities through participation in projects and grants; - Formation of an image of a successful teacher\ scientist\ with high material and moral status and demand in the labor market in parents and children

End of Appendix 2

Stages of transition	Events in the media, Internet and social networks	Stimulation mechanism
University student	- Individual support and consultation of scientists on the project carried out by the student through scientific websites; - Use of social networks to disseminate information about the successful life (material and moral) of scientists and research teachers in Russia - Conducting interactive events at the university with scientific topics with the participation of world's leading scientists; - Dissemination of information in the media, the Internet and social networks about the state's attention to the development of science, material/moral incentives for scientists, housing issues and jobs, and high international wages; - Creation of scientific websites; - Creation of funds for the development of science in the youth environment.	- Formation of scientific worldview; - Formation of competencies in project and research activities through participation in projects and grants of the university; - Scholarship (presidential, gubernatorial, enhanced university-based, Academy of Sciences, etc.); - Presentation of their research findings at conferences (with reimbursement of expenses from public funds for the development of science) with the available specific results; - Publication of research results with reimbursement of expenses from public funds for the development of science) with the available specific results.
Post-graduate student Doctoral candidate	- Individual support and consultation of scientists on the project carried out by the school student through scientific websites; Use of social networks to disseminate information about the successful life (material and moral) of scientists and research teachers in Russia; - Conducting interactive events at the university on scientific topics with the participation of leading scientists of the world; - Dissemination of information. Dissemination of information in the media, the Internet and social networks about the state's attention to the development of science, material/moral incentives for scientists, housing issues and jobs, and high international wages; - Creation of scientific websites; - Creation of funds for the development of science in the youth environment.	- Formation of competencies in project and research activities through participation in projects and grants of the university; - Scholarship (presidential, gubernatorial, enhanced university-based, Academy of Sciences, etc.); - Presentation of their research findings at conferences (with reimbursement of expenses from public funds for the development of science) with the available specific results; - Publication of research results with reimbursement of expenses from public funds for the development of science) with the available specific results; - If a scientist shows good research performance results, they can be provided with corporate housing without the right of privatization.
Source: own elaboration.		

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HISTORY OF ECONOMIC AND SOCIOLOGICAL THOUGHT

Revisiting the Issue of the "Initial Accumulation of Capital" in Post-Soviet Russia*

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Abstract. The inclusion of those economies that are "peripheral" in relation to so-called "first world" countries into the paradigm of capitalist development is a topical issue of globalization. This process turned out extremely dramatic in its implications for former Soviet republics, in particular for post-Soviet Russia. The country, which had a highly capitalized economy "at the start" of market transformation, faced the fragmentation of socialized property and its transition to the form of private ownership. Politicians, public figures, experts, and scientists often interpret the stage of the 1990s "capitalist transition" from the standpoint of the "initial accumulation of capital" – a well-known category of Marxist political economy. However, we find this approach highly controversial. The goal of our paper is to find out whether it is legitimate to talk about the applicability of the key provisions of this theory to characterize the processes that took place in Russia in the first post-Soviet decade. This can be done by analyzing the theory of initial accumulation and its modern interpretations. In the first part of the article, we give a brief overview of the development of the theory of initial capital accumulation from its original provisions formulated by K. Marx to modern interpretations of this process. The second part considers the content of a discussion on the processes of post-Soviet capitalist transformation in Russia through the prism of the theory of initial accumulation. The third part uses actual data on the dynamics of fixed assets, gross fixed capital accumulation, investment activity to make a critical assessment of the processes of capitalist accumulation of capital in Russia in the last decade of the 20th century. We conclude that in the post-Soviet period there was a fragmentation of socialized property and its transition to private ownership, which contradicts the

key provisions of the concept of initial accumulation (liquidation of property of small producers and its socialization). The novelty of the obtained results lies in the fact that the historical process that took place in Russia in the last decade of the 20th century was defined as a process of appropriation and secondary redistribution of state property, accompanied by catastrophic processes of decapitalization.

Key words: capital, fixed assets, capital accumulation, initial accumulation, decapitalization.

Introduction

One of the primary informative elements of globalization is the inclusion of "periphery", in relation to so-called "first world" countries[1], economies into processes of capitalistic production and reproduction. Together with "third world" territories, since the late 1980s – the early 1990s, countries of "socialistic nature", many of which had already finished the transition from agricultural to industrial economy, were actively included within capitalism system. This process was extremely dramatic for ex-republics of the Soviet Union: in particular, for post-soviet Russia. Large scale economic crisis and sharp social deconstruction were the consequences of fierce struggle for entities of public property, which were created within Soviet planned-administrative system, and for control over economic "commanding heights" in a new state.

Opinions on the inevitability of initial accumulation in Russia, as the first stage of "transition to capitalism", became very popular among politicians and experts in the 1990s – the 2000s. Speculative and unsubstantiated appeal to the concept of initial accumulation proved to be a convenient basis for justifying the negative consequences of the former system of centralized economic management breakdown and the accelerated implementation of market relations. The goal of this article is to find out, on the basis of initial accumulation theory analysis, whether it is acceptable to talk about Russian initial capital accumulation in the first post-soviet decade. In the first part of the article, we look through the development of the initial accumulation theory: from its original provisions by K. Marx to modern expanding interpretations of this process. In the second part, we analyze the content of the discussion on post-soviet capitalism transformation processes in Russia through initial accumulation theory. In the third part, on the basis of actual data, we assess the processes of capital accumulation in Russia, which happened in the last decade of the 20th century.

We analyze only this time period, because, in our opinion, country's economic structure in its modern shape had been already formed at the beginning of the 2000s. Despite historical context of the research, we think that the study of these issues is still relevant (in scientific and practical meaning), because it lets us deeply understand the nature of current "new Russian capitalism" and contribute to the discussion on why, after nearly three decades, Russia, despite its considerable development potential, continues to remain on the periphery of global capitalism system.

"Initial capital" theory: brief history

In chapter 24 of the first volume of *Capital,* Marx revealed the secret of capitalism emergence through "initial accumulation" which precedes capitalism accumulation while arguing with representatives of classic political economy about "divine" emergence of wealth; "initial accumulation", according to Marx, is not the result of capitalistic way of production

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[1] The group of "first world" countries traditionally includes the most economically developed countries of Western Europe, North America, Japan.

but its starting point [1]. On the basis of England's experience, Marx shows classic form of "initial accumulation" starting from the story of how farmers were driven off the land and formed a new proletariat for capitalist farmers first and then for industrial capitalists. When proletarization began, the production of surplus labor became a historic trend of capitalist development.

Marx describes "initial capital accumulation" as historic stage, which precedes "capitalism accumulation" as the "prehistory" of capital and its corresponding way of production. The essence of initial accumulation, according to Marx, was "the separation of producer from production means". As Marx noted, initial capital accumulation, its historic genesis is "the expropriation of direct producers, i.e. the destruction of private property based on one's own labor". Initial accumulation in Marx's interpretation is the "prologue" of capital history, which means transformation of individual and fragmented production means into socially concentrated ones. He saw the historic mission of initial capital accumulation in creation of capitalism relations through separation of a worker from a property on terms of his work, transformation of social production means and living means into capital, and direct producers − in hired employees [1].

For quite a long time, the issues related to initial accumulation were reviewed through Marx's approach, i.e. it was assessed as historically limited process, contents of which is the separation of owners from production means in transition from feudal to capitalism relations. The discussion touched upon different aspects of initial accumulation in England and other European countries.

Interest to initial accumulation theory strengthened in the 1970s: it was caused by growing expansion of international capital from traditional centers (USA and Western European Countries) to countries of capitalist periphery due to the end of "Golden age" and the necessity to overcome crisis of over-accumulation. It is connected with the emergence of new approach toward assessment of initial accumulation as the process which accompanies the transition of pre-capitalist societies in the capitalism stage of its development, not as historically localized process (limited by early Modern period).

A.G. Frank, who studied processes of global accumulation since the late 15th century, noted the substantial similarity between processes taking place in the "third world" countries in the second half of the 20th century and "initial accumulation" described by Marx. To separate them from classic processes of initial accumulation, he proposed the term "primary accumulation" [2].

According to S. Amin, each time when capitalist way of production enters into relations with pre-capitalist ways of production and subordinates it, there is a transfer of value from pre-capitalist to capitalist formations as a result of the action of initial accumulation mechanisms. These mechanisms are not strictly related to pre-history of capitalism, they are typical for modern times too. Exactly these forms of initial accumulation, modified but sustainable, in favor of the center, are the area of accumulation theory on global scale [3].

In the last twenty years, expanded approach toward initial accumulation was developed in modern neo-Marxist literature. It was related to strengthening trends of neo-liberal globalization since the late 20th century. Many researchers interpreted "initial accumulation" as a continuous process, immanent to capitalist accumulation as a whole. The logic of this approach is that the division of workers and production means are always reproducible, only its forms and methods change.

W. Bonefeld notes that capitalistic public relations are based on separation of population from production means. This division was a result of initial accumulation and became a reproducible basis of capitalist public relations. It means that we are talking about the transformation of initial accumulation from capitalism's historical prerequisite into fundamental premise of its existence [4].

According to M. De Angelis [5], initial accumulation is external economical prerequisite for capitalist production, which is integral and continuous element of modern society; its temporal dimension includes the period of establishing the capitalist production way and the period of its preservation and expansion. Capital must always take part in strategies of initial accumulation in order to recreate "basis" of accumulation itself: division between producers and production means (modern "enclosures").

Objects of initial accumulation are, on the one hand, territories on pre-capital development stage. On the other hand, which is more important, its object is balance of powers between antagonistic classes of labor and capital, which prevents the progress of capitalist accumulation process. For example, labor rights and social guarantees achieved as a result of previous class conflicts and enshrined by the state.

M. Perelman [6] speaks about "modern initial accumulation", the beginning of which is related to the completion of capitalism's "Golden age" at the end of the 1960s, when the necessity of finding new income sources and providing renewed dynamics of global capitalist production both appeared. Initial accumulation in its current modification has a twofold nature. On the one hand, it is a process which shows the continuity with classic initial accumulation. It touches upon territories, where capitalist relations have not yet supplanted the traditional economy. In many parts of the world, there is an illegitimate expropriation of land from indigenous peoples. It is carried out in favor of large private owners with the support of local governments, which are in need of money due to the high debt burden and dependence on foreign creditors and therefore interested in the deployment of industrial production as a source of tax revenues. Besides, this is often accompanied by bribery of political leaders by representatives of private capital. On the other hand, it is the initial accumulation in its modern context, representing "the central part of the project aimed at creating a world of hypercapitalism" according to neoliberal dogmas. It is not aimed at individuals' private property, but at destroying the foundations of social welfare throughout the globalized world, in order to increase the profits of large capitals. In other words, it is not about the confiscation of individuals' property, it is about the elimination of public goods. This type of initial accumulation is carried out in forms of reducing labor costs by transferring production to developing countries, restricting workers' rights, attacking social protection and pension systems, reducing taxes and public sector, commercializing education and health care, privatizing or exploiting environmental facilities, etc.

This point of view is shared by M. Hardt and A. Negri. They describe initial accumulation as steadily renewable process of constant proletarianization of non-capitalist environment, the nature of which is in capital replenishment of labor force achieved by creating and attracting new proletarians from non-capitalist countries [7, p. 226]. At the same time, M. Hardt and A. Negri go beyond this concept, speaking about the "post-modern" initial accumulation associated with the change of the essence of labor and accumulated wealth, which is becoming increasingly intangible, in

the modern world: it includes social relations, communication systems, information, and emotional interactions.

These scientists assign a special role to the accumulation of information, which (like the classic initial accumulation described by Marx) destroys or destructs pre-existing processes of production but immediately combines them into networks of a new order and provides the highest levels of productivity in various spheres of production. The growing socialization of production, along with the reduction of social space and time, provides increased productivity, thereby benefiting private capital [7, pp. 256–259].

According to D. Harvey [8], "initial accumulation" and expanded reproduction are elements of total capitalist accumulation, which are organically connected. At the same time, the latter is based on current exploitation of hired workers, and the former — on different violent and fraudulent acts aimed at explicit and implicit appropriation of property. Processes of initial accumulation have had continuous and sustainable nature in the whole process of capitalism development, its role is the solution of excessive accumulation problems, which are generated by the expanded reproduction of capital.

D. Harvey characterizes current practices of initial accumulation with the term "accumulation by deprivation of property". It might be conducted in several ways: through the expulsion of the peasants from the land and their subsequent proletarization; privatization of resources which previously were in common ownership; privatization of state-owned industrial facilities; seizure of family farms by large agribusiness; modern forms of slavery; appropriation of assets through mergers and acquisitions, as well as through various types of financial and corporate fraud for seizure or devaluation of assets, etc. The key role in

accumulation processes through deprivation of property is played by collusion between state and financial capital.

Summing up a brief review of "initial capital accumulation" theory, it is possible, in our opinion, to identify three main approaches to the interpretation of this phenomenon:

— as historically limited process of transition from feudal to capitalist relations, the starting point of capitalist production way (the classic model described by Marx);

— as the process repeated in the transition from pre-capitalist to capitalist relations, the contents of which is the separation of owners from production means;

— as the process immanently natural for capitalist accumulation, expressed in constantly reproducible separation of producers from production means (expanded interpretation).

Due to current circumstances, we stick to the second approach. It is possible to point out three meaningful aspects in Marx's interpretation of initial accumulation: the essence of this process (separation of producers from production means by liquidation of private property of small producers and collectivization of labor); its form (violent, illegitimate, predatory nature), and methods of implementation (expropriation of land and other means of subsistence; appropriation of state and church property; robbery of colonies; usage of public loans system, tax system, protectionism system, etc.). These characteristics, in our opinion, are key components of initial accumulation: essence aspect is the most significant, while the other two are still important but not quite so. Violent actions, as well as different methods of extra-economic exploitation, accompany various phenomena associated with the implementation of certain economic interests, including those not related to the promotion of capitalist production way and corresponding social

relations, while the unique property of initial accumulation process is its content side, which gives meaning to Marx's logic.

We can talk about modern modifications of capital processes of accumulation, reproduction, and flow (redistribution). In the modern global world, the initial capital accumulation may take place in the local dimension: in cases when peripheral territories are involved in the orbit of capitalist relations, which move from the agrarian to the industrial order, where there is a formation of local capitalists' classes (including participation of foreign capital) and employees.

In "initial capital" interpretations, the stress is usually put on its secondary generic signs. At the same time, essence aspect, explicitly formulated by Marx, is missed. Later in this article, we show that the same feature may often be found in the assessment of processes that took place in Russia in the first post-soviet years.

Discussion on "initial accumulation" in post-Soviet Russia

The last decade of the 20th century of Russian history was characterized by fast liquidation of planned-administrative system of economy's governance and transition to market principles of economic organization. One of the most significant phenomena of this period was the redistribution of material resources in favor of "new owners" and the concentration of capital, formerly owned by the state, in private hands. All of this took place during the denationalization and transformation of property rights.

Popular approach to the assessment of this phenomenon was its definition as the "initial capital accumulation" process. It was proposed by representatives of radical reformers in the early 1990s: in particular, by Ye. Gaidar [9], Ye. Yasin [10], A. Chubais[2], B. Berezovsky [11].

It emphasized the "objective conditionality" of this process as an inevitable phase of transition from "socialism" to "capitalism". Within this concept, the "initial capital accumulation" was seen as a necessary prerequisite for the transition of material resources' aggregate into the hands of "efficient owners", capable of organizing its best management in new market environment and ensuring the further process of capitalist transition. At the same time, some kind of "theoretical basis" was formed, which allows large justification of negative phenomena in the economy and social sphere, which were natural for the period of post-soviet transformation in the 1990s.

The thought of the last decade of the 20th century being the period of initial accumulation remains quite popular: top state officials[3] and famous public figures[4] made such comments. The irony is that Marx's terminology is often pronounced by those who share anti-Marxist and ultra-liberal views. It is interesting that Marx's concept was not accepted and developed in the most liberal economic science, despite the fact that hard work, knowledge, and creative initiative of entrepreneurs are considered starting points of capital's formation by him: these are obviously not the virtues which provided enormous fortunes of most "new Russian capitalists" at the turn of 20th—21st centuries.

This approach to transformation processes in Russian society has also become quite popular in domestic and foreign literature.

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[2] Russian capitalism: from initial capital accumulation – to development. *Zavtra=Tomorrow*, 2016, no. 38.

[3] Putin does not deny the problem of corruption in Russia (https://ria.ru/20050906/41315240.html); Dmitry Medvedev: the elite is the elite because it learns quickly (https://www.kommersant.ru/doc/1182693)

[4] See: On respect for business and businessmen (https://republic.ru/posts/1220925); Vladimir Kara-Murza, "Putin's Regime trampled law with tarpaulin language" (https://www.golos-ameriki.ru/a/a-33-a-2004-12-23-5-1/633497.html); Day of the Russian flag: the victory day of freedom or the sad date of the failed democracy commemoration? (https://www.svoboda.org/a/24297197.html)

According to S.S. Dzarasov, violent privatization of public property in ex-socialist countries became a clear confirmation of Marx's initial capital accumulation theory, which was conducted by the method of violent seizure (expropriation) of somebody else's property [12, p. 54]. S.A. Dolmatova also shares this position: she points out privatization of state property as the primary mechanism of initial capital accumulation in post-soviet Russia [13, p.69].

In V.A. Biryukov's opinion, the process of initial capital accumulation was the essence of ongoing transition from planned-socialist to market-capitalist system in Russia. The author sees the meaning of initial accumulation in the elimination of former, pre-market way of connecting a worker with production means, in the creation of labor market (labor force), and the concentration of money and production means (monetary and productive capital) in the hands of certain individuals – resources' owners [14, p. 25].

V.A. Barzakovskii thinks that initial accumulation in post-soviet Russia was conducted through redistribution of property in favor of certain individuals while using different inst-ruments – first of all, privatization. At the same time, he notes that initial capital accumulation in this period cannot be interpreted in a traditional way of its understanding [15].

According to B. Plyshevskii, capital accumulation in the 1991–1998 period was an initial one according to the sources and ways of its implementation, because it went on in the environment of denationalization, and non-economic redistribution of property, reduction of GDP, uncontrolled inflation, excess of nominal monetary demand over the real goods and services' supply. Primary sources of capital accumulation (in its monetary and commodity form) were appropriation of state property through its privatization and reduction of population's living standards due to hyperinflation [16, p. 25].

A. Korostelev defines initial capital accumulation as the process of illegal privatization of open joint stock companies' profits, pseudo-legally covered by law presidential decrees [17].

D. Mandel notes that in post-Soviet Russia there was a process similar to the one which assisted the formation of European class of capitalists, who concentrated in its own hands production and existence means and left the proletariat only its labor for sale, through widespread appropriation and plunder. This is the process which Marx described as the concept of initial accumulation [12].

According to D. Harvey, any public formation or territory, following capitalist way of development, should undergo large-scale changes which Marx described as "initial accumulation" ("accumulation through deprivation of property" in Harvey's terminology). This problem was also underlined by the collapse of the USSR, which resulted in a "wild" period of initial accumulation in the form of "shock therapy" in accordance with the recommendations of capitalist countries and international institutions. At the same time, the author emphasizes that the distribution of assets, as the result of privatization and market reforms, was unilateral and not very favorable for types of investment activities which provide expanded reproduction [18, p. 153].

This approach is also developed by F. Tonkiss who notes that privatization, as the way of accumulation through deprivation of property rights, was especially acute in the process of buying up state production assets (especially, the ones of oil industry enterprises) in Russia, after the collapse of the Soviet Union. According to him, this process could be primarily defined as "initial accumulation", proposed by Marx [19, pp. 16–22].

In S. Clarke's opinion, Russian "initial accumulation" process was interrupted by The October Revolution and finished in the Soviet period, when peasants were deprived of property and turned into state employees, implementing the program of industrialization.

On the contrary, the basis of "initial capital accumulation" in the late 1980s and the early 1990s, during the integration of the Soviet economy into the global capitalist economy, were huge profits of commercial intermediaries who conducted arbitration transactions: it happened as a result of prices' mismatches on domestic and global markets [20].

T. Brass uses the term "neo-liberal initial accumulation", the feature of which was "accumulation through deprivation of property rights". The author describes it on the example of former state oil companies (which became joint-stock companies), the shares of which were distributed among employees. The company's management deliberately delayed the payment of wages to employees, leaving them in a very difficult financial situation, and then organized the sale of consumer goods to employees in exchange for their own shares [21].

N. Holmstrom and R. Smith draw an analogy between the process of initial accumulation, described by Marx, and the processes which took place in post-communist countries at the end of the 20th century. The result of this process, from their point of view, was the emergence, on the one hand, of "criminal capitalists", who illegally seized state property, and, on the other hand, of "real Russian proletariat", who was deprived even of formal ownership rights to the production means and forced to sell their labor on the market [22].

V.A. Kozlov and N.P. Korobkova also found noticed parallels between initial accumulation in Western Europe countries in early Modern period and processes happening in Russia at the end of the 20th century. They propose usage of the term "quasi-initial accumulation" to characterize the latter [23]. N.A. Simchenko and others support this point of view emphasizing that, in post-soviet Russia, as the result of market transformation, "the second coming of the initial capital accumulation" began, in contrast to the "first one", undergoing in the 17th−19th centuries. [24].

Position of G.M. Gukas'yan and other authors is similar to this approach. They note that "modern Russia is going through a process associated with the abandonment of the command and administrative system based on directive pricing and centralized allocation of resources, and the transition to market methods of regulation − this is a fundamental difference between the "initial accumulation" in the old sense of the term and the new one. They are united by the process of creating a class of entrepreneurs, which have a material basis in the form of private property" [25].

G.A. Shalamov and O.I. Pushkareva come to the conclusion that, after 1991, it took twenty years for Russia to finish the initial accumulation stage. Western European countries did the same for two and a half centuries. At the same time, they refer to the difference between this process in modern Russia and initial accumulation "in Marx's times". This dissimilarity is that production means were "already created and they needed to be transferred from state to private property" before the end of the Soviet period [26].

In V.A. Tsvetkov's opinion, "initial accumulation of Russian capital" was going on during "spontaneous privatization" (1988−1991). After this time, huge resources ended up, with state officials' assistance, in the hands of illegal structures which included heads of enterprises, foreign adventurers, and criminals. Some of them were also able to create "financial cushions" for subsequent redemption of

enterprises through privatization and create a relatively clean business [27, pp. 206–207].

In the most detailed form, the concept of initial capital accumulation is presented in the works of E.V. Krasnikova [28; 29]. According to her, in terms of content, initial capital accumulation is a process of separation of the direct producer from production and living means, which leads to the formation of monetary capital with its following transformation into industrial capital. The concentration of free money in the hands of the most enterprising members of society is achieved through its withdrawal (by illegal and violent methods) from those who have them. The emergence of industrial capital completes possession of the last real sector of the economy. As the result, capital becomes dominant economic category [26].

A number of Russian and foreign authors take a different approach to assessing the processes of socio-economic transformation of post-soviet Russia in the late 20th century.

R.Kh. Simonyan and T.M. Kochegarova point out that the category "initial capital accumulation" characterizes a long process of capitalization, which is expanded in time and used for creating a volume of financial and material resource, necessary for the beginning of private capitalist production. In their opinion, there was "no initial or second initial accumulation" in Russia in the early 1990s. However, there was a "one-time distribution of financial and material resources for private (capitalist) production" [30, p. 119].

As M. Burawoy notes, in the 1990s, instead of expected neo-liberal break-up with the past or neo-institutional evolutionary transition to future capitalism, Russia went through "involutive degeneration" caused by the expansion of the exchange sphere at the cost of reducing the production sphere. Transition to market happened, but it led to a retreat to old production forms, the formation of a "neo-feudal state", and it was not accompanied by capital accumulation [31].

According to David M. Kotz, "the strategy of neo-liberal transition led to the emergence of non-capitalist predatory/extractive system from the former socialist state system" [32].

According to M. Lebskii's approach, due to objective reasons (the presence of large property on the basis of industrial mode of production, the presence of many hired employees, whose labor force contained an element of marketability), the need for classic "initial capital accumulation" was absent (since the property was already accumulated and had to be converted into capital). He defines the process of capitalist relations emergence at the turn of the 1980s–1990s as a post-statism transition – the process of transformation of super-statism society into semi-peripheral capitalism, which included three stages: shadow bureaucratization of state property; fragmentation and capitalization of state property; accumulation and concentration of capital on the basis of semi-peripheral capitalism [33].

So, we can speak about two opposite points of view toward the nature of capitalist transformation of Russia in post-soviet period. How could it be assessed with the theory of initial accumulation?

As we noted earlier, the approach, according to which economic processes are identified as "initial capital accumulation", is based on the theory of initial accumulation outlined by K. Marx in Chapter 24 of his *Capital*. The main postulates of the theory are: the separation of the small commodity producer from production means by destroying his property; the transformation of individual and fragmented production means into socially concentrated ones; the formation of capitalist relations by separating the worker from property due to his working conditions; the transformation

of social production and living means into capital, and direct producers — into hired workers [1]. External negative effects of initial accumulation, which are connected with expropriation of property and usually used for referring and drawing historic parallels in order to justify similarities, are secondary effects which accompanied initial accumulation but were not its generic features.

Considering this, can we describe the 1990s period in Russia as the time of initial capital accumulation? In our opinion, we cannot. Even if capital accumulation took place, it could not be called, according to K. Marx's terminology, "initial". In post-soviet period, there was a fragmentation of socialized property, and its transition to the form of private property, which contradicts the key provisions of "initial accumulation" concept.

Initial capital accumulation according to Marx's terminology was primarily completed in the USSR in the 1930s within forced industrialization and collectivization of agriculture, and its last stage was so-called "liberation" of collective farmers after the adoption of the new passport system in 1974 [34]. It should be mentioned that collectivization of production in USSR was defined as the most important form of production socialization[5]. At the end of Soviet period, the country had capitalized economy with a high degree of monopolization and concentration of production. The level of concentration in production was the highest in the world [35, p.102]. In primary industries of the USSR, as a whole, one enterprise had 700 employees in the mid-1980s, while, for example, in Germany — only 150 people[6]. Formally, within the framework of the

constitutional norm on "public property", production means were a common property of Soviet citizens. However, in reality, individuals had no rights to the possession and disposal of "their" part of the property due to its full socialization. The bulk of the population also had no opportunity to influence the processes of property management. There was also no private property of many direct commodity producers, based on their own labor; public property was universal.

It could be assumed that all Russian citizens received a nominal opportunity to become owners of state property, including production assets, in the short period of privatization, and only then this property was expropriated by new future capitalists. However, this period was brief, and the transfer of production means to private ownership did not have a broad public nature. Small owners did not have time, and, objectively, this class could not emerge due to the disparity of starting positions of representatives of various social groups in relation to formally state property at the initial stage of denationalization.

Top positions were primarily occupied by those who were "in the right place at the right time": among top managers of enterprises at the time of the Soviet system collapse, or among those who managed to create starting capital in a planned economy environment (more precisely, in its shadow sector).

To some extent, it is possible to speak about the accumulation and concentration of financial and organizational resources to ensure the best conditions for seizure of state property and appropriation of previously created capital. However, under no circumstances, it could be identified with Marx's "initial accumulation", not in historical, economic or wide-scale sense.

"Initial accumulation" or decapitalization?

Another important question that emerges, while studying historic essence of Russia's post-

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[5] Prokhorov A.M. (Ed.). *The Great Soviet Encyclopedia: in 30 vols. Vol. 13.* Moscow: Sovet. entsikl., 1973. 608 p.

[6] Vinogradov V.V. *Economy of Russia: textbook for universities.* Moscow: Yurist, 2001. 319 p.

soviet transformation in the last decade of the 20th century, in our opinion, is whether it is possible to speak about capitalist accumulation existing in this period. If the answer is "yes", what would be its scale?

In this paper, we base our analysis on generally accepted approaches to the definition of capital. In classic political economy, "capital" usually means physical (real, productive) capital: production means are used for manufacturing goods and services — machinery, equipment, buildings, and structures. In K. Marx's interpretation, capital is a certain social, production relation represented in a commodity and giving it a specific social nature; it is not just a sum of material and produced production means, these are means of production converted into capital [1].

So, taking into account these classic definitions, can we say that, despite all the difficulties of the transitive stage, conditions for further transition to a qualitatively new state of productive forces within the capitalist mode of production were formed, and the potential for further progressive development of society's socio-economic system was created?

The beginning of the 1990s in Russia included forced transition of state ownership into private hands. During 1992, the share of state-owned fixed assets decreased from 91 to 69%, of non-state-owned assets — increased from 9 to 31%. By the beginning of 1995, the share of fixed assets of non-state property became predominant — 58%[7], and it did not change significantly in the following period.

At the end of 1997, non-state-owned fixed assets were estimated at 7.307 billion rubles. At the same time, government's income from privatization of this property was only 34.8 billion rubles which was less than 5%, and,

taking into account the following reevaluation, not more than 11% of these assets' real cost [36, p. 61]. We can say that, after receiving, almost for nothing, huge chunks of industrial capital created by social labor in the Soviet period, the new class of owners had a very favorable starting position for expanding capitalist reproduction.

However, it did not happen. According to official data, volume of fixed capital accumulation annually declined in the 1990s[8]. In comparable estimates, it was only 49.5% in 1999 from the level of 1991, while GDP, as a whole, declined to much smaller extent — to 62%[9]. The share of gross fixed capital accumulation in the structure of GDP usage decreased from 23.8% in 1991 to 15.8% in 1999[10].

The volume of fixed assets' commissioning (buildings, structures, machinery, equipment, vehicles, etc.) gradually decreased after 1990. In 1995, in comparable prices, it was only 26.4%, in 1998 — 22.6% from the level of 1990.

Even more noticeably, this decline affected the industries which produce goods — the industries that are the foundation of the economy (22.3 and 18.3%, respectively)[11].

The situation began to change slightly for the better only at the very end of the decade, but this happened because of the change of external macroeconomic situation: increase of the demand on the global market of hydrocarbon raw materials (for example, in the

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[7] *Russian statistical yearbook.* Moscow: Goskomstat Rossii, 2000. 269 p.

[8] Gross fixed capital accumulation is an indicator that reflects the investment of funds in fixed assets (fixed assets) in order to create new income in the future by using them in production. Gross fixed capital formation includes the following components: acquisition, net of disposal, of new and existing fixed assets; costs of improvement of non-produced tangible assets (land, mineral reserves, natural forests and other natural resources); costs associated with the transfer of ownership of non-produced assets (natural resources, patents, licenses, etc.).

[9] Calculated according to: Russian statistical yearbook, 2000. P. 249, 265.

[10] The same source. P. 265.

[11] Calculated according to: Russian statistical yearbook, 2000. P. 271.

period from 1998 to 2000, the excess profit from Russian oil exports increased by 8.2 times [36, p. 61]).

The coefficient of fixed assets' renewal[12] decreased during the last two decades of the Soviet period. Thus, it was 10.2% I the RSFSR in 1970, 8.2% in 1980, and 5.8% in 1990. However, the situation became truly catastrophic in the first post-soviet decade. Thus, in 1992, the coefficient of fixed assets' renewal decreased to 3.2%, and in 1997−1998 − to 1.1%[13]. Calculations, performed in different years by Russian economists, showed a significant (2.2−3.5 times) prevalence of the production assets' disposal rates over its commissioning rates in the 1990s − the early 2000s [37; 38].

The degree of deterioration of enterprises and organizations' fixed assets averagely increased to 38.6% in 1995 and 42.4% in 2000 in the economy; in industry − to 46.2% and 52.4%, respectively; in agricultural production − to 37.6% and 50.4%; in construction − to 37% and 44.6%; in the transport industry − to 40.1% and 47.8%; in trade and public catering − to 33.6% and 48%[14].

Untimely replacement, forced or intentional lack of renewal led to the prolongation of usage of physically and mentally worn out machines and equipment. In industrial sector, the share of fixed assets with a service period up to 5 years decreased from 29.4% in 1990 to 4.7% in 2000, from 6 to 10 years − from 28.3% to 10.6%, while the share of fixed assets "aged" from 11 to 15 years increased from 16.5% to 25.5%, from 16 to 20 years − from 10.8% to 21%, over 20 years − from 15% to 38.2% [39, pp. 62−63]. Thus, a decade after the beginning

of the post-soviet transformation, "non-market capital" (as defined by I.B. Voskoboynikov), i.e. fixed assets, put into operation during the planned economy, continued to play a decisive role in production, while the share of "market capital", put into operation after 1990, barely exceeded 15% in the total volume of fixed assets. For comparison: in the RSFSR industry of the 1970s the share of fixed assets with a service period up to 10 years was 70.8%, in 1980 − 64.2%, in 1990 − 57.7% [39, pp. 62−63].

Investment activity in this period primarily performed the function related to the maintenance of the previously accumulated capital. To be more precise, the part of it which could be involved in production of goods demanded by the market. Financing of capital investments was carried out "on the residual principle", which directly contradicts the true nature of capitalist accumulation. This led to the fact that in new "market" realities, production turned out to be fundamentally much less efficient than in the framework of the planned system of "developed socialism" with its inherent disadvantages, such as high degree of extensiveness and orientation toward the priority achievement of gross indicators.

A study conducted by the magazine "Expert" among the 400 best Russian companies showed that, at the beginning of the 21st century, more than a decade after the beginning of market transformation, only 6% of companies were not associated with the exploitation of Soviet assets; it was primarily companies from the sectors of telecommunications (and its segments), banking, and retail trade[15]. It might be assumed that this state of affairs was involuntary, that it happened due to objective difficulties caused by new owners' lack of sufficient financial

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[12] Commissioning of fixed assets (excluding livestock), in a percentage from the availability of fixed assets at the end of the year.

[13] Russian statistical yearbook, 2000. P. 270.

[14] *Ibidem*. P. 270.

[15] Grishankov D., Kabalinskii D. Six percent of the new economy. Expert, 2004, no. 37.

resources for investments in the expanded production of productive capital. But the facts tell a different story.

In 1992, at the beginning of radical market transformations, the volume of goods and services' export from Russia was four times higher than in 1991 (in comparable prices). At the same time, the volume of fixed capital gross accumulation increased by 12%. Average annual export volume for 1992–1999 was 1.8 times higher than in 1991, and the annual gross fixed capital accumulation was 2.2 times lower[16].

According to S.M. Men'shikov, in 1992–2001, the gross profit of the economy in Russia amounted to 31.9% of GDP, while in the United, in 1989–1998 — 20.8%. According to official data, in the last decade of the twentieth century, the rate of surplus product in Russia was, on average, 60% higher than in the United States, but if you take into account the hidden incomes of the capitalist class, it is 2.2 times higher. That is, together with the state property, the new owners appropriated to themselves an increased share of the surplus product, which previously remained at the disposal of the state and passed into private hands under new circumstances [36, pp. 260–261].

Increased profits were used in order to excess consumption and to form speculative capital with its partial withdrawal abroad. Capital outflow from Russia increased (in USD) from 3.4 billion in 1994 to 19.8 billion in 1997, it increased again to 25 billion in 2000 after some decline during the crisis of 1998–1999. In 1994, capital outflow was 1.2% of GDP and 5.6% of domestic investment, in 2000 — 10% and 57.4%, respectively [36, p. 67].

Thus, the processes which took place in Russia in the first post-soviet decade, in our opinion, might be defined as a crisis of capitalist

accumulation. It was accompanied by a reduction in the volume of production capital and the transfer of its significant part in the form of speculative financial capital.

Conclusions

Soviet economic system, with all of its fundamental differences from the capitalist model (rigidly centralized management, policy planning, state ownership of the means of production, the absence of a free market), was similar to it in, at least, one aspect: it was based on the exploitation of wage labor with the use of socialized production means and the change of surplus product into fixed assets' accumulation (i.e., capital). In other words, the state acted as a collective capitalist, appropriating surplus value. Formally, Soviet citizens had the status of "co-owners" of public production means, but in reality the fact of hiring an employee to the enterprise, not his legal position as the owner, was dominant [40, p. 24]. Not accidentally, some researchers defined the Soviet economic system as a "state capitalism" [41].

In our opinion, the post-soviet transformation of Russian economy represented a unique case of integration of unique system, which had been developing for decades in its own way, into global capitalist system. By the time of the USSR collapse and the start of the post-soviet development period, Russia had a highly capitalized economy with a marginal level of production socialization. In post-soviet period, there was a fragmentation of socialized (formally — "public", in fact — state) property and its transition into the form of private property. It contradicts the key provisions of initial accumulation concept, formulated by Marx.

In this regard, we consider the common scientific approach, which characterizes the period of the 1990s in Russia as "a stage of initial capital accumulation" insufficiently justified. The reason is that it is focused on

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[16] *Russian statistical yearbook,* 2000. P. 249, 265.

secondary features of this process (of illegal and violent nature), not on the essential aspect of initial accumulation (the liquidation of the property of small producers and its socialization, according to the classic interpretation of K. Marx).

On the basis of the conducted research, we came to the conclusion that the described phenomena might be interpreted as the process of appropriation and secondary redistribution of state property, accompanied by processes of decapitalization, which were catastrophic for the economy and the country.

On the one hand, there was a withdrawal of "old" capital from the economy by closing and selling of "inefficient" industries. On the other hand, the influx of "new" capital, created within the market economy, decreased in several times. The scale of the capital disposal was much higher than the scale of its accumulation. Therefore, in our opinion, we can talk about the decapitalization of the economy that took place in the form of a reduction of productive capital and transfer a substantial part of it in the form of speculative financial capital.

At the same time, decapitalization of the economy did not mean complete absence of capital accumulation. It happened, but in the form of accelerated formation of major private financial capitals, which were used primarily for speculations and were not connected with production of public goods for capitalist profits. Otherwise, major part of fixed production capital, privatized by state, was sacrificed for the formation of quite large private capitals,

excluded from the process of expanded production. In fact, there was a rollback from the state capitalism of the Soviet period to the primitive form of trade-usurious capitalism of the pre-industrial era.

The Russian economy has become part of the global capitalist system, occupying a peripheral position as a supplier of raw materials and highly skilled labor resources, and a market for large transnational corporations in this exact form.

In the early 1990s, the foundations of the economic model were laid, which, with some changes, exists today [42]. Instead of piecemeal structural reforms, associated with the de-monopolization and creation of conditions for development of private entrepreneurship in sectors with high added value (at the expense of cheap raw materials, availability of developed production and engineer infrastructure, and high-skilled labor), the path of destruction of the old economic structure was chosen. It was done for getting immediate benefits under the disguise of "initial accumulation of capital". As the result, the Russian economy turned out to be far away from the most developed state-corporate stage of modern capitalism [43], in comparison with its state at the end of the Soviet period. The way out of this dead-end paradigm naturally implies the rejection of the myth of the initial accumulation of capital in post-Soviet Russia that it was a difficult but inevitable process, which was necessary for the "legitimization" of the country's transition to the capitalist path of development.

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DISCUSSION PLATFORM

Russian Economic Journals Indexed in Web of Science: Current State and the Ways of Increasing International Visibility

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Abstract. Determination of strategic directions for development of Russian journals included in the international database Web of Science requires improvement of methods for assessing their level. The article proposes an approach, the essence of which is determined by the use of bibliometric analysis methods for a comprehensive assessment of the state of Russian economic journals, based on the indicators obtained from both international and national citation systems. Our data sources include indices that form the core of Web of Science and the Russian Science Citation Index. We assess the state of 18 Russian economic journals, including the journal *Economic and Social Changes: Facts, Trends, Forecast* issued by Vologda Research Center of RAS. We summarize the experience of this journal in improving its international visibility. We define the factors that impede the integration of Russian journals into the world scientific and information space and outline strategic tasks that should be addressed so that the journals' position in the international space could be improved. The results obtained can be used by scientific organizations and editors to make decisions on the development of periodicals. The conclusions of our study are important for discussing the problem related to choosing approaches and criteria for evaluating scientific journals.

Key words: economic journals, bibliometric indicators, international visibility of the journal, international scientometric databases, Web of Science, Emerging Sources Citation Index.

Introduction

Due to the emergence of new challenges of Russia's policy in the field of science, the role of scientific journals that present research findings of Russian scientists both nationally and globally has increased. The need to find new ways to integrate into the international space has increased with the launch of the national project "Science"[1] in 2018, which has set tasks for research teams to increase their performance in international scientometric databases (ISDB) and increase the number of journals indexed in them. At the same time, the priorities of the publication policy have been adjusted in favor of qualitative indicators. Thus, the goals of the national project state the number of articles in the first and second quartile journals indexed in the international databases Web of Science and Scopus, and the number of scientists who have published articles in such journals.

Obviously, it is extremely difficult for organizations engaged in socio-economic research to meet such targets. According to expert estimates, highly rated international journals contain a small number of publications by Russian economists, which is due to significant entry barriers associated with the specifics of manuscript review, lack of authors' affiliation with leading foreign universities and lack of academic degrees obtained in these organizations [1, p. 259]. In this situation, it becomes particularly relevant to develop and promote Russian economic journals included in global citation indexes, to raise their academic level and status in the international space. According to experts, the internationalization of journals provides growth points for the development of science in Russia and prospects for improving its scientific positions in the international arena [2]. Editors need to build a stable system of work to improve the quality characteristics and increase the international visibility of their journals so as to be able to compete with leading foreign publications. In order to determine strategic directions for further development of journals with international certification, it is necessary to work out new approaches to assess their level, which would allow monitoring their quality not only in the national but also in the global segment.

The difficulty of solving this problem lies in the fact that the scientific expert community has not developed clear criteria for evaluating scientific journals. The discussion has unfolded between the supporters of two main approaches — quantitative and qualitative. Despite the lengthy nature of the discussion, experts have not yet reached a consensus on the effectiveness of both scientometric indicators and the expertise of academic journals. The lack of an authoritative scientific citation base in Russia and the low level of scientific ethics [3] are the main obstacles to the establishment of a generally accepted method for evaluating journals. The revealed limitations of bibliometric and expert analysis indicate that the use of any of the approaches, as a rule, does not give a complete picture of the state of scientific periodicals.

In our opinion, we should not underestimate the possibilities of expert evaluation for characterizing small groups of journals. At the same time, quantitative factors may have an advantage for objective analysis of a large sample of publications. In addition, the use of bibliometric indicators is justified for evaluating journals that have already passed the examination and are indexed in ISDB.

Modern research based on the use of bibliometric analysis methods also covers those Russian journals that were included in the Web of Science Core Collection (WoS) relatively recently (in 2015 and later) [4; 5]. Some of the findings are quite applicable to economic journals. However, there is still a need for a separate assessment of their level in order to identify challenges related to improving their quality.

Taking into account the above, we analyzed the bibliometric indicators of Russian economic journals included in WoS in order to conduct a comprehensive assessment of their status and determine possible ways to increase the international visibility of publications. We used the data obtained from the analytical systems Web of Science and Russian Science Citation Index (RSCI) and characterized journals' positions in the international and national segments of scientific periodicals. Since the reference group also includes the journal *Economic and Social Changes: Facts, Trends, Forecast* published by Vologda Research Center of the Russian Academy of Sciences, we presented a description of its indicators in dynamics and relative to indicators of other journals, and also backed some conclusions with examples from the experience of its development.

The results obtained are relevant not only for identifying strategically important tasks for the development of the selected journal. They can be used by scientific organizations and editorial offices to make decisions on the promotion of periodicals. In addition, the findings of the study are important for developing an approach to the construction of a methodology and selection of criteria for evaluating a scientific journal.

A brief theoretical overview of approaches to evaluating economic journals

To date, there are two main approaches to assessing the level and quality of scientific journals – quantitative, based on the use of bibliometric indicators, and qualitative, which involves expert assessments.

Noting the advantages of quantitative factors, experts emphasize that, although they do not evaluate the content aspects of the journal, but the formal ones, there is a list of formal requirements, compliance with which is considered mandatory in the scientific community for a good journal. Qualitative parameters allow us to objectively assess the scientific level of the journal, but their use is associated with high resource costs, problems of selection of experts, and selection of criteria for analysis [6, pp. 18-19].

If we consider the traditions of evaluating economic journals, we can say that in foreign practice, methods based on the use of different combinations of bibliometric indicators are quite strong. Although one of the earliest ratings of economic journals developed by R. Hawkins, L. Ritter and I. Walter was based on an analysis of the opinions of a wide group of economists who participated in ranking journals from the list formed for the survey [7].

Attempts to evaluate the quality of journals using quantitative methods were mainly related to citation analysis. In early studies, the number of references received by the journal from certain sources [8] or from a pool of "major" journals [9; 10], and the institutional affiliation of the authors of articles [11] were used as criteria for such an assessment. Simple methods of calculating indices were proposed, which measure their contribution to the development of the discipline by analyzing citations of publications from leading economic journals [12].

With the emergence of citation indexes, the methods for evaluating journals based on the study of statistical data from citation systems [13], including the impact factor proposed by E. Garfield [14], have become widely used. Attempts to neutralize the shortcomings of the impact factor led to the emergence of more complex methods based on weighing citations from journals of different levels [15].

Rapid development of the scientometric approach in evaluating economic journals was reflected in the development of their ratings. Efforts to understand the results of rating products have led to the formation of such a method as aggregating the results of various ratings [16]. Despite the existing limitations, such ratings, according to researchers, offer relatively objective information about the scientific quality of publications [17] and are considered a very important tool for evaluating the performance of economic institutions and individual scientists [18].

As for the Russian experience in identifying the level of economic journals, it has been developing in accordance with the international tradition. We gave a detailed overview of such studies earlier [19]. Here we note only that to date several methodological approaches have been developed in this area. The expert approach is based on the sociological assessments of the opinions of the academic community. The results are presented in the ratings of economic journals, the most famous of which are the NRU HSE project [20] and the rating compiled under the guidance of A.Ya. Rubinshtein [21]. The bibliometric approach based on the analysis of scientometric indicators is reflected in the journal ranking techniques developed by A.A. Murav'ev [22], O.V. Tret'yakova [19, 23]. The cross-citation analysis is related to the network analysis

technique based on the identification of systemically significant scientific journals in networks [24]. The Rating of Leading Russian Economic Journals (LREJ Rating) developed by E.V. Balatsky and N.A. Ekimova, is based on the intersection of bibliometric and expert approaches. To date, the results of the fifth wave of LREJ Rating have been published [25]. Like other countries, Russia uses an approach related to the aggregation of existing rating products (Subochev rating [26]; Balatsky—Ekimova consensus rating [27]).

According to the expert community, both quantitative and qualitative approaches used today to evaluate academic journals have both strengths and limitations. The relatively arbitrary choice of bibliometric indicators and their weak correlation with the scientific authority of journals, as well as the insufficient validity of the procedure for aggregating the indicators used, are indicated as vulnerable points in the ratings [28]. The disadvantages of the examination are seen in the problems of selection of experts, in the subjectivity of the assessment, in the impossibility of covering large volumes of publications.

In our opinion, it is almost impossible to do without taking into account quantitative indicators in the process of analyzing fairly large volumes of publications. Moreover, we have always paid attention to the fact that quantitative assessment is not prevailing and in most cases requires the imposition of expert opinion on the results obtained. However, when it comes to journals indexed in international scientometric databases, it is necessary to take into account the fact that these journals have already passed expert evaluation and confirmed their compliance with international quality standards. The analysis of their bibliometric indicators will thus be useful for obtaining

objective characteristics that reflect the dynamics of their development and position relative to each other. In addition, when conducting a comprehensive assessment of the status of the small number of journals that are indexed in ISDB, it is important to take into account their indicators obtained from both international and national citation systems in order to clarify some of the conclusions.

Results of assessment of the state of Russian economic journals according to indicators in the international scientometric database Web of Science

At the moment, more than a thousand economic journals are published in Russia. Of these, about 500 publications are indexed in the RSCI. As of December 2019, 18 economic journals are included in the international scientometric database Web of Science. All these publications are included in the Emerging Sources Citation Index (ESCI), which was added to the Web of Science Core Collection at the end of 2015 in order to cover important regional journals and give the academic community the opportunity to discover new areas of research, identify trends in the development of science with additional high-quality data. At the launch of the index, about 1.5 thousand journals were selected, and new publications were added weekly until 2016. As of April 2016, the index included about 3,500 journals [29].

It should be noted that before the introduction of the ESCI index, Russian economic journals were not represented in the Web of Science Core Collection. The first Russian economic journal that was included in the ESCI was the journal *Economic and Social Changes: Facts, Trends, Forecast* published by Vologda Research Center of the Russian Academy of Sciences. Its English-language version was among 16 Russian journals that were included in this index at the first stage of selection[2].

An important aspect that characterizes this new journal index is that all the publications included in it are considered candidates for inclusion in the main journal indexes: Science Citation Index Expanded, Social Sciences Citation Index, Arts & Humanities Citation Index. In this case, the decision is made on the basis of analyzing the citation of articles published in them [30]. Thus, Russian journals included in the ESCI are faced with the task of increasing their citation. Those publications that successfully cope with it will have the opportunity to enter one of the main indexes, be ranked by the value of the impact factor and be included in the corresponding quartile.

It is obvious that editors have a lot of work to do to promote their publications in the international environment. In order to develop strategies for their development and identify certain target indicators, it is necessary to organize regular monitoring of bibliometric indicators of publications in Web of Science in order to compare them with indicators of other Russian journals on similar topics, which are also included in Web of Science, and with the data on foreign journals. The complexity of such a monitoring due to the fact that the impact factor is not calculated for publications included in the ESCI [30]. Therefore, other indicators that are automatically generated in Web of Science can be selected for their evaluation, or journal impact factors can be calculated using the methodology adopted in this database.

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[2] List of Russian journals as of the end of November – the beginning of December 2015 in the new citation index ESCI. Available at: https://academy.rasep.ru/news/383-spisok-rossijskikh-zhurnalov-na-konets-noyabrya-nachalo-dekabrya-2015-g-v-novom-indekse-tsitirovaniya-esci

Table 1. Data on Russian economic journals indexed in Web of Science (ESCI) for the period 2015–2019

Journal	h-index	Total number of publi-cations, units	Total number of citations, units	Number of citations without self-citation, units	Average number of citations per article, units	Self-citation coeffi-cient, %	Proportion of links from articles whose authors are affiliated with Russian orga-nizations, %	Proportion of links from articles whose authors are affiliated with foreign organi-zations, %
Voprosy Ekonomiki	9	443	656	418	1.48	36.3	95.8	4.2
Economy of Region	7	499	557	395	1.12	29.1	87.4	12.6
Foresight and STI Governance	7	130	281	271	2.16	3.6	72.2	27.8
Terra Economicus	6	192	172	121	0.9	29.7	77.7	22.3
Economic Policy	5	283	187	139	0.66	25.7	84.8	15.2
The Journal of the New Economic Association	5	216	175	158	0.81	9.7	93.7	6.3
Journal of Institutional Studies	5	165	159	86	0.96	45.9	93.6	6.4
Journal of Mining Institute	5	484	232	212	0.48	8.6	95.7	4.3
Economic and Social Changes: Facts, Trends, Forecast	4	457	163	105	0.36	35.6	89.8	10.2
World Economy and International Relations	4	764	283	183	0.37	35.3	96.1	3.9
International Organisations Research Journal	4	186	112	70	0.60	37.5	58.1	41.9
Journal of Tax Reform	4	69	54	31	0.78	42.6	82.5	17.5
The Manager	3	285	77	54	0.27	31.1	51.8	48.2
Business Informatics	3	130	53	36	0.41	32.1	72.3	27.7
Economics and the Mathematical Methods (archive for 2017–2019)	2	123	14	9	0.11	35.7	92.3	7.7
Russian Management Journal (archive for 2018–2019)	1	31	2	3	0.06	50.0	100	0
Contemporary Europe (archive for 2016–2019)	2	433	45	33	0.10	26.7	78.4	21.6
The St Petersburg University Journal of Economic Studies (archive for 2017–2019)	1	72	15	8	0.21	46.7	93.3	6.7
Source: own elaboration using Web of Science data as of December 1, 2019.								

In *Table 1*, we have summarized the indicators of eighteen Russian journals that publish research findings on economics and are included in the ESCI, Web of Science. Pointers that form the core of WoS were used as data sources: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI. Statistics data were obtained by processing a direct query with the name of each publication in the Main Search mode. The time period was limited to 2015–2019. We chose 2019 as the upper limit in order to have indicators that characterize the current state of Russian economic journals, although it should be noted that the system is still being filled with documents for 2019, so a number of conclusions for the period under study can be clarified in the future.

Journals are ranked by the value of the Hirsch index. Their evaluation is carried out with the help of citation indicators. According to the total number of citations in WoS, the journal *Voprosy ekonomiki* is the leader. However, it is necessary to say that the value of this indicator is influenced not only by the importance, authority and popularity of the journal, but also by its volume. Since publications differ significantly from each other in volume, it is advisable to estimate the average citation. The selected indicator reflects the average impact of one article. A five-year publication window and a matching citation window are usually used to analyze the average citation. The average number of citations received over the past five years by articles published during the same five years (per article) is determined [31].

As we can see from the data in Table 1, only three journals have more than one citation per article: *Foresight and STI Governance*, *Voprosy ekonomiki*, and *Economy of Region*. At the same time, if accor-ding to the total number of citations the journal *Voprosy ekonomiki* is the leader, then based on the average number of citations per article, the journal *Foresight and STI Governance* has the best score − 2.16 citations per article.

Besides, we should point out a high level of self-citation of almost all publications. Global requirements based on Web of Science data determine acceptable values of the self-citation coefficient up to 20%, since 80% of WoS journals have a self-citation coefficient close to this value[3]. Of the journals we analyzed, only three (*Foresight and STI Governance, The Journal of the New Economic Association, Journal of Mining Institute*) have self-citation

coefficients within the acceptable value of 20%, while the other journals have them ranging from 25 to 50%.

In addition, according to the findings of our research, articles from domestic economic journals receive citations in WoS mainly from Russian authors. For example, the share of references to the leading Russian journal *Voprosy ekonomiki* from authors who are affiliated with foreign organizations is less than 5% of its total number of citations. These results largely correlate with the data of the studies on citation of Russian journals included in the ESCI [4].

In our opinion, the current situation is due, first, to the recent inclusion of Russian journals in the international database Web of Science, and second, to a number of factors that prevent their successful integration into the global scientific and information space. The main problem is their low international visibility, which can be increased, on the one hand, by expanding the geography of authors by inviting foreigners and publishing the findings of joint research with foreign scientists, and on the other hand − by expan-ding the range of Russian economic journals in the Web of Science.

The indicators of the journal *Economic and Social Changes: Facts, Trends, Forecast* prove that at the moment it is experiencing a number of difficulties similar to the problems of most Russian journals included in WoS. Judging by the relatively low number of links to the journal (on average, 0.36 citations per article), its promotion goals should include significant increase in its international visibi-lity. However, the share of citations from articles the authors of which are affiliated with foreign organizations is more than 10%. This indirectly confirms the fact that the editor has chosen the right direction of work to promote the journal in the international segment.

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[3] Russian scholarly journals in the Web of Science. *Okna rosta*, 2014, no. 19 (95), p. 4. Available at: https://okna.hse.ru/news/149357826.html

Table 2. Summary bibliometric indicators of Russian economic journals* indexed in the Web of Science and in the Russian Science Citation Index for 2018 (data of the Scientific Electronic Library as of August 2018)

No.	Journal	Founder/publisher	City	Journal's score in Science Index-2018	Two-year impact factor	Rank	Five-year impact factor	Rank	Five-year self-citation coefficient, %	Rank	Five-year Herfindahl index for citing journals	Rank	Herfindahl index for authors' organizations	Rank
1.	*Voprosy ekonomiki*	Editorial Board of the journal *Voprosy ekonomiki*	Moscow	22.669	5.645	1	4.201	1	4.6	6	77	1	730	3
2.	*Foresight and STI Governance*	National Research University "Higher School of Economics"	Moscow	13.928	2.189	4	3.018	2	0.9	1	90	3	1429	11
3.	*Economy of Region*	Institute of Economics of the Ural Branch of RAS; Ural Federal University	Yekaterinburg	11.334	3.295	2	2.493	3	5.8	7	92	4	507	2
4.	*The Journal of the New Economic Association*	ANO "Journal of the New Economic Association"	Moscow	6.908	2.372	3	1.763	4	1.9	5	106	6	1478	12
5.	*World Economy and International Relations*	Institute of World Economy and International Relations of the Russian Academy of Sciences; Russian Academy of Sciences	Moscow	6.400	1.893	7	1.221	10	6.2	9	79	2	2238	13
6.	*Economic and Social Changes: Facts, Trends, Forecast*	Vologda Research Center of the Russian Academy of Sciences	Vologda	5.193	1.895	6	1.449	6	8.1	10-11	116	7	840	5
7.	*Economic Policy*	Russian Presidential Academy of National Economy and Public Administration; Gaidar Institute for Economic Policy	Moscow	4.545	2.054	5	1.380	8	6.1	8	126	8	1182	6

* Indicators of journals included in WoS.

End of Table 2

No.	Journal	Founder/publisher	City	Journal's score in Science Index-2018	Two-year impact factor	Rank	Five-year impact factor	Rank	Five-year self-citation coefficient, %	Rank	Five-year Herfindahl index for citing journals	Rank	Herfindahl index for authors' organizations	Rank
8.	The St Petersburg University Journal of Economic Studies	Saint Petersburg State University	Saint Petersburg	4.098	1.559	11	1.385	7	8.1	10-11	141	9	2325	15
9.	Journal of Institutional Studies	OOO Gumanitarnye perspektivy	Rostov-on-Don	3.599	1.685	9	1.324	9	13.7	17	267	14	775	4
10.	International Organisations Research Journal	National Research University "Higher School of Economics"	Moscow	3.031	1.329	12	0.939	11	1.1	2	225	11	3333	18
11.	The Manager	Ural State University of Economics	Yekaterinburg	2.790	0.961	14	0.649	16	1.7	4	97	5	1352	9
12.	Russian Management Journal	Saint Petersburg State University	Saint Petersburg	2.481	1.884	8	1.534	5	9.8	13	258	13	2896	16
13.	Terra Economicus	Southern Federal University	Rostov-on-Don	1.908	1.625	10	0.667	14-15	1.4	3	146	10	484	1
14.	Contemporary Europe	RAS Institute of Europe, Russian Academy of Sciences	Moscow	1.721	0.928	16	0.667	14-15	11.5	14	281	17	2977	17
15.	Business Informatics	National Research University "Higher School of Economics"	Moscow	1.236	0.672	18	0.750	13	8.3	12	236	12	1270	7
16.	Economics and the Mathematical Methods	CEMI RAS; Russian Academy of Sciences, RAS Market Economy Institute	Moscow	1.079	0.957	15	0.757	12	12.6	15	273	15	2295	14
17.	Journal of Mining Institute	Saint-Petersburg Mining University	Saint Petersburg	0.364	0.769	17	0.336	17	13.3	16	278	16	1389	10
18.	Journal of Tax Reform	Ural Federal University; Baikal State University	Yekaterinburg, Irkutsk	-	0.964	13	-	18	22.5	18	1025	18	1289	8

The results of evaluation of scientific economic journals according to the indicators that determine their status at the national level

In order to assess the current status of journals at the national level, we analyzed their bibliometric indicators in the Russian Science Citation Index for 2018[4]. Comparing the data obtained with the results of the analysis of journal indicators in WoS helps clarify some conclusions and adjust the development objectives for an individual publication, and for scientific journals published in Russia in general.

To compare the indicators of the journal *Economic and Social Changes: Facts, Trends, Forecast* and other Russian economic journals included in WoS, we have summarized a number of bibliometric indicators that allow us to perform a comprehensive analysis of their citation *(Tab. 2)*. In the general list, journals are ranked according to an integral indicator[5] in the Science Index-2018 rating. For each journal, the values of five indicators are given: the two-year and five-year impact factors, the five-year self-citation coefficient, the five-year Herfindahl index for citing journals[6], and the Herfindahl index for organizations of authors[7].

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[4] All the data are given as of August 2018.

[5] The integral indicator of the journal, which is the basis for building the Science Index rating, is calculated on the basis of several bibliometric indicators. The basis of the calculations is the indicator five-year impact factor of the journal in the RSCI taking into account the citation of the translated version of the journal (if available) and taking into account self-citation, normalized based on average number of references in the bibliography, as well as the share of links in the five-year period used in the calculation of the impact factor. The resulting value is divided by the Herfindahl index for citing journals, normalized to its possible minimum value in this direction

[6] The five-year Herfindahl index for citing journals is calculated as the sum of the squares of the percentages of journals that cite this one in relation to the total number of citations (the calculation takes into account references from the current year to the previous five years, including self-citation).

[7] The Herfindahl index for authors' organizations is calculated as the sum of the squares of the percentages of the number of articles published by various organizations in relation to the total number of articles in the journal in the current year in which the organization is identified.

All indicators are ranked. As a result, the so-called summary rating of journals is obtained; it is a systematized set of absolute and relative indicators of journals for the year and it is a necessary tool to make vertical and horizontal comparisons.

Indicators of the two impact factors – two-year and five-year – are selected as ranking criteria. As we explained earlier in our research, this is due to the desire to identify the journals that publish the papers that receive most citations since their publication, and at the same time to smooth out the outliers from the influence of individual articles with abnormal citation by using a wider publication window [19]. To assess the authority that the journals indexed in ISDB have in the Russian academic community, we compared the values of the two-year and five-year RSCI impact factor with their median values in the group of journals in the category "Economy. Economic science" (data of the Russian Science Citation Index as of August 2018). We have found out that all the journals had two-year and five-year impact factors higher than the median value for the discipline (the median distribution of the two-year impact factor values of the journals in 2018 was 0.371; the median distribution of the five-year impact factor values was 0.289). Twelve editions had the value of the two-year impact factor more than 1. Thus, the share of highly cited journals is 67%. They can be described as having a high level of impact in the academic environment.

Evaluating the level of journals' self-citation by WoS indicators, we conclude that it is high. At the same time, almost all journals (except for the *Journal of Tax Reform*) have low self-citation coefficients in the RSCI. They prove that the journals have chosen the right policy in this aspect. According to the data obtained, we can say that the high percentage of self-citation in Russian economic journals in WoS is due to

Figure 1. Dynamics of indicators of the number of articles and citations of the journal *Economic and Social Changes: Facts, Trends, Forecast* in the RSCI (data of the Scientific Electronic Library as of August 17, 2019)
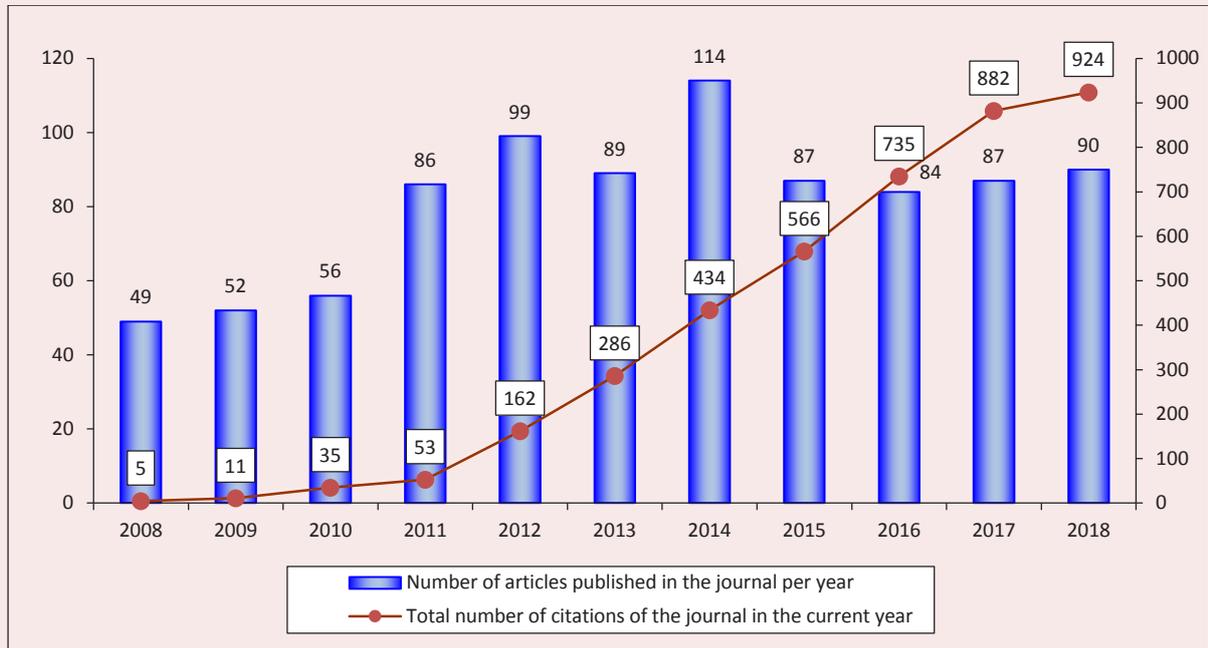
Figure 2. Dynamics of the impact factor of the journal *Economic and Social Changes: Facts, Trends, Forecast* in the RSCI (data of the Scientific Electronic Library as of August 17, 2019)
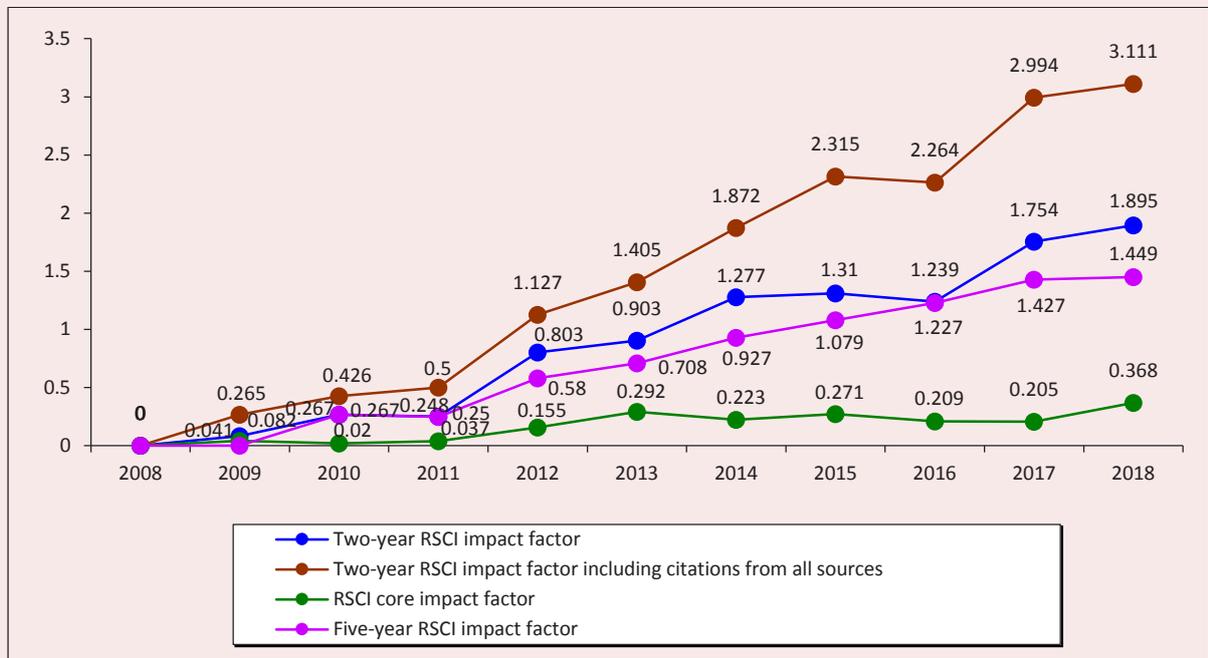
Figure 3. Dynamics of self-citation coefficients of the journal *Economic and Social Changes: Facts, Trends, Forecast* in the RSCI (data of the Scientific Electronic Library as of August 17, 2019)
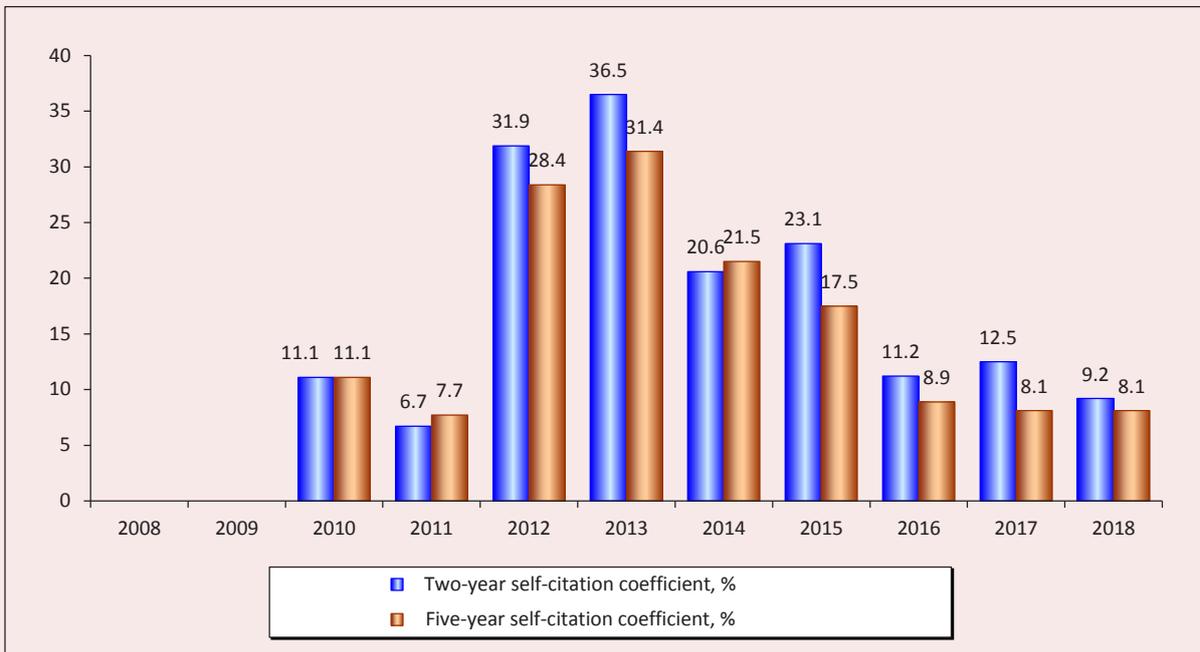
Figure 4. Dynamics of the five-year Herfindahl index for citing journals and the Herfindal index for organizations of authors of the journal *Economic and Social Changes: Facts, Trends, Forecast* in the RSCI (data of the Scientific Electronic Library as of August 17, 2019)
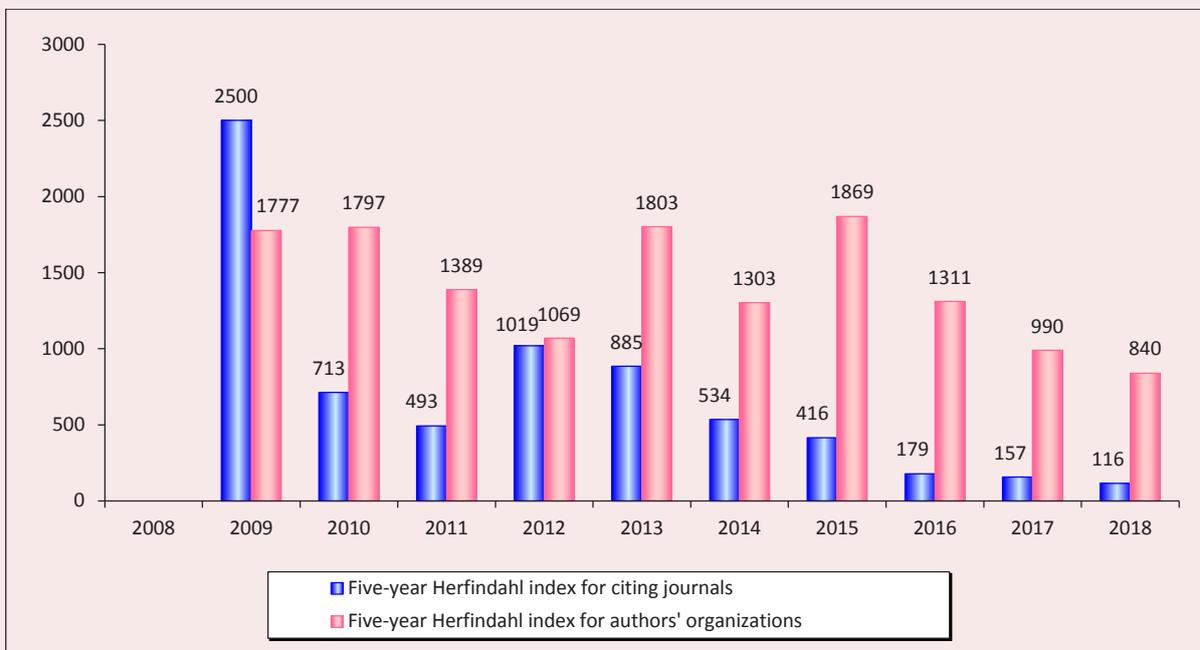
objective reasons. All of the above confirms that today the small number of Russian economic journals indexed in WoS is a limiting factor for them. This fact, which somewhat distorts the situation concerning citation, has a negative impact on the self-citation indicators in ISDB.

In order to take into account not only the volume but also the scale of citation, i.e. to distinguish the publications that have a small number of sources that refer to them from the journals that are well known in the academic community, we used the Herfindahl index for citing journals. Low values (less than 1000) of this indicator for all the journals except for the *Journal of Tax Reform*, allow us to conclude that they are in demand among a wide range of publications.

At the same time, the analysis of the Herfindahl index values for authors' organizations revealed a high proportion of local publications among Russian economic journals with international certification, i.e. those with a narrow circle of authors who are usually affiliated with the parent organization. According to the index values for 2018, the total share of publications with a high level of locality (Herfindahl index value above 1000) was 72% (13 journals).

Having analyzed the indicators of the journal *Economic and Social Changes: Facts, Trends, Forecast* we see that it occupies a fairly high position among other publications of similar remit. In 2008–2019, about 900 scientific articles were published in its issues; the subject of the articles corresponds to the priority areas of fundamental and applied research in the field of economics. Since 2015, the annual volume of articles has stabilized, while the rate of growth in the number of citations has continued to increase. In 2018, the annual number of citations received by the journal increased by 1.6 times compared to

the level of 2015, the year in which the journal was included in the Web of Science database *(Fig. 1)*.

On the whole, positive dynamics of the journal's impact factors *(Fig. 2)* allows us to draw a conclusion that its scientific authority is increasing. According to the values of the two-year and five-year impact factors of the RSCI for 2018, the journal ranks sixth among 18 other journals from the reference group *(Tab. 2)*. Judging by the value of the two-year impact factor (1.895) the journal is highly cited, has a certain impact on the development of its scientific field and is perceived by the scientific community of economists as authoritative. It should be emphasized that the increase in the impact factor is due to an increase in the number of links from external sources, which is indicated by a decrease in the self-citation coefficients of the journal *(Fig. 3)*.

The growing popularity of the journal in the scientific community is indirectly evidenced by the dynamics of the five-year Herfindahl index for citing journals *(Fig. 4)*. The data presented in the diagram clearly show that, after the journal was included in the WoS, the range of publications that cite it has significantly expanded. This is confirmed by a decrease in the index value by 3.5 times in 2018 compared to the value of 2015. Another significant achievement in the development of the journal is related to overcoming its nature as a local publication. The decrease in the Herfindahl index for authors' organizations in 2017 and 2018 indicates the effectiveness of the editor's work to expand the geography of the journal's authors.

It is important to note that in general, according to the results of a comprehensive bibliometric analysis, which is conducted in the RSCI for periodicals, the journal *Economic and Social Changes: Facts, Trends, Forecast*

ranked 7th in the Science Index rating for 2018 on the subject "Economy. Economic sciences" (from 386 journals; data of the Scientific Electronic Library as of August 17, 2019), improving its rank by two positions compared to the 2017 rating.

Dynamics of the journal's positions in the Science Index rating *(Tab. 4)* clearly shows that over the past five years, the journal's position has improved significantly: if in 2014 it ranked 52nd in the thematic rating among 347 economic journals, being at the same time on the 565 place in the overall rating, then in 2018 it reached 53rd place in the overall

rating (among 3,542 journals), improving its position 10-fold, and it reached 7th place in the thematic rating among economic publications.

In 2018, the journal was included in the core of top ten scientific publications on economics, affiliated with organizations of the academic sector *(Tab. 5)*. Since 2016, it has been included in the Diamond List of Russia's leading economic journals (Balatsky–Ekimova rating) [25; 32], compiled on the basis of an analysis of bibliometric parameters and expert assessments *(Tab. 6)*. Thus, at present, we can state that the journal is among Russia's leading economic journals.

Table 3. Top 10 journals from the Science Index rating for 2018 on the subject "Economy. Economic sciences"
(data of the Scientific Electronic Library as of August 17, 2019)

Journal	SI value	Rating position 2017	Rating position 2018
Voprosy ekonomiki	22.669	1	**1**
Foresight and STI Governance	13.928	2	**2**
Economy of Region	11.334	3	**3**
The Journal of the New Economic Association	6.908	7	**4**
Spatial Economics	6.604	5	**5**
World Economy and International Relations	6.400	4	**6**
Economic and Social Changes: Facts, Trends, Forecast	5.193	9	**7**
Economic Policy	4.545	13	**8**
The St Petersburg University Journal of Economic Studies	4.002	24	**9**
Tomsk State University Journal of Economics	3.947	11	**10**

Table 4. Dynamics of values of the integral indicator and positions of the journal *Economic and Social Changes: Facts, Trends, Forecast* in the Science Index rating
(data of the Scientific Electronic Library as of August 17, 2019)

Indicator	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
The journal's score in the SCIENCE INDEX rating	0.014	0.156	0.210	0.237	0.333	0.723	1.080	2.852	3.792	5.193
Place in the Science Index ranking on the subject "Economics. Economic sciences"	117	58	67	68	70	52	45	13	9	7
Number of journals in the Science Index rating on the subject "Economics. Economic sciences"	201	228	252	291	322	347	369	386	388	388
The journal's place in the overall Science Index rating	1632	781	842	914	897	565	420	111	74	53

Table 5. Top 10 journals from the Impact Rating of economic journals of the academic sector – 2018

Journal	Indicators in the RSCI for 2016 (RSCI data as of April 2018)				Integral indicator	Position
	IF_2	IF_5	HI_J	HP		
Voprosy ekonomiki	7.288	4.650	81	33	2.000	1
Economy of Region	2.500	1.484	146	7	0.757	2
The Journal of the New Economic Association	1.118	0.828	117	0	0.731	3
Studies on Russian Economic Development	2.538	2.104	206	3	0.699	4
Economic and Social Changes: Facts, Trends, Forecast	1.363	1.149	176	4	0.568	5
The Bulletin of the Institute of Economics of the Russian Academy of Sciences	0.788	0.499	155	3	0.552	6
ECO	0.910	0.628	161	3	0.543	7
Spatial Economics	2.000	1.357	304	2	0.485	8
Applied Econometrics	0.981	0.799	230	0	0.414	9
Economics of Contemporary Russia	0.607	0.829	224	0	0.412	10

Notes: IF_2 – two-year RSCI impact factor without self-citation (including the translated version); IF_5 – five-year RSCI impact factor without self-citation; HI_J – Herfindahl five-year index for citing journals; **HP** – number of highly cited (hot) papers.
Source: The impact rating of academic journals in economics: ranking criteria and methodology. Compiled by O.V. Tret'yakova [19].

Table 6. Diamond List of Russian economic journals, 2019

Journal	Founder/publisher (city)	Position in the 2016 rating	Position in the 2019 rating
Voprosy ekonomiki	Editorial Board of the journal *Voprosy ekonomiki* (Moscow)	1	1
Foresight and STI Governance	National Research University "Higher School of Economics" (Moscow)	2	2
Economy of Region	Institute of Economics of the Ural Branch of RAS; Ural Federal University named after the first President of Russia B.N. Yeltsin (Yekaterinburg)	3	3
World Economy and International Relations	Russian Academy of Sciences, Institute of World Economy and International Relations of the Russian Academy of Sciences (Moscow)	7	4
Studies on Russian Economic Development	Institute of Economic Forecasting of the Russian Academy of Sciences (Moscow)	6	5
International Organisations Research Journal	National Research University "Higher School of Economics" (Moscow)	15	6
Terra Economicus	Southern Federal University (Rostov-on-Don)	8	7
The Journal of the New Economic Association	"Journal of the New Economic Association" (Moscow)	5	8
Economic Policy	Russian Presidential Academy of National Economy and Public Administration; Gaidar Institute for Economic Policy (Moscow)	4	9
Economic and Social Changes: Facts, Trends, Forecast	Vologda Research Center of the Russian Academy of Sciences (Vologda)	10	10
Russian Journal of Money and Finance	Central Bank of the Russian Federation (Moscow)		11
Business Informatics	National Research University "Higher School of Economics" (Moscow)	14	12
Russian Management Journal	Saint Petersburg State University. Higher School of Management (Saint Petersburg)	17	13

Source: Leading Russian Economic Journals Rating – 2019. Compiled by E.V. Balatsky and N.A. Ekimova [25; 32].

Ways to increase the international visibility of a scientific journal

The analysis has revealed a number of problems that are mostly typical of all Russian economic journals included in the Web of Science. In our opinion, with the expansion of the range of Russian journals in this database, the problem of high self-citation will gradually be leveled by increasing the share of links from external sources. At the same time, each of the journals will have to improve the accessibility of published materials for the international scientific community. This can be done by expanding the number of foreign authors, improving the quality of published materials by strengthening peer review and inviting leading foreign experts to evaluate the articles.

The availability of a full-text English version of the journal is an important condition for increasing its international visibility. According to O.V. Kirillova, "English-language journals are much more likely to achieve high results than the journals issued in the language of the country in which they are published" [2]. In our opinion, the best way is to issue the journal in two identical versions in Russian and English, in which the output data of the articles completely coincide. The journal *Economic and Social Changes: Facts, Trends, Forecast* is published in this very format. According to experts, publishing Russian journals in two languages seems to be the most appropriate solution, because when making the journal available to foreign readership, it is also important to preserve the Russian scientific language and scientific communication in the Russian-speaking environment [2].

Editors use various methods to ensure that the journal is in demand by the international academic community. For this purpose, journals are sent to foreign libraries and placed in foreign repositories; they are placed in open access [33]. The search for articles by Russian authors in the international information space is improved by assigning digital object identifiers to publications, which provide cross-linking of articles from world journals on the portals of foreign publishers and contribute to their correct citation [33; 34]. Editors develop programs for the participation of journals in public events, develop networks of so-called "ambassadors" of publications, i.e. persons who work to find new authors, including foreign ones [34].

The experience of the journal *Economic and Social Changes: Facts, Trends, Forecast* in implementing the above goals was presented at the international conference "World-Class Scientific Publication" [35]. Summarizing the main conclusions of the report, we note that long-term research projects that are being worked on jointly with foreign scientific organizations, as well as the direct participation of the journal in international projects, contribute a lot to improving the quality of foreign content.

SI-DRIVE (Social Innovation: Driving Force of Social Change) is one of the most successful projects in which the journal participated. It was implemented for four years by a scientific consortium that comprised 26 countries. Russia was represented solely by a group of researchers from Vologda Research Center of the Russian Academy of Sciences. The journal issued by VolRC RAS was presented at international seminars and conferences held within the framework of the project: in Leiden (Netherlands, February 2017), Dusseldorf (Germany, April 2017), and Brussels (Belgium, October 2017). In January 2018 the journal was presented in Brussels at the first meeting of the European School of Social Innovation (ESSI), which was formed after the completion of the SI-DRIVE project. In the same year, the journal became an official partner of ESSI.

The work of the journal in this project helped solve several important tasks related to the expansion of the geography of its foreign authors and strengthening the composition of the Editorial Board by inviting foreign participants[8] of the project to join it. Based on the results of joint research, the project published a series of articles prepared by authors from different countries: The Netherlands, UK, Spain, Portugal, Germany, Lithuania, Turkey, and Brazil (see *EaSC*: 2016, no. 5, pp. 195-218; 2017, vol. 10, no. 4, pp. 242-258). Two joint publications were published by scientists from Vologda Research Center in collaboration with SI DRIVE project manager from Germany (see *EaSC*: 2017, vol. 10, no. 5, pp. 21-36), as well as with researchers from Spain and China (see *EaSC*: 2018, vol.11, no. 2, pp. 52-68.). It should be emphasized that the published materials cover issues that are actively discussed in the European academic community, so the potential for citing them is estimated to be quite high.

Participation in major international conferences as a so-called "supporting journal" has become another point of growth for the development of foreign content of the journal. In particular, it has been an information partner of the Management International Conference for three years. Presentations of the journal were held in the framework of the Editorial Panel in Italy (2017), Slovenia (2018), and Croatia (2019). As a result, several articles were published by authors from European countries: Romania, Poland, Croatia, and Hungary (see *EaSC*: 2017, vol. 10, no. 6, pp. 234-247; 2018, vol. 11, no. 4, pp. 185-201; 2018, vol. 11, no. 5, pp. 182-197; 2019, vol. 12, no. 4, pp. 220-233).

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8 During the project implementation, the following scientists were included in the Editorial Board of the journal: Tüzin Baycan (Turkey), Ka Lin (China), Peter Oeij (The Netherlands), Josef Hochgerner (Austria), and Antonius Schröder (Germany).

Another event that is significant for the development of the journal is its presentation at the international seminar on trust issues held in Tokyo (Rikkyo University, October 2018). The results of the seminar showed that a number of Japanese and Russian studies on social problems, despite the presence of specific features for each country, are based on similar methods. That is why it was decided to present the research findings of Japanese colleagues on the pages of the journal. Its previous issue contained three articles by scientists from Japan on the formation and development of sociological knowledge in their country (see *EaSC*: 2019, vol. 12, no. 5, pp. 158-174.).

All of the above makes it possible to state that the measures listed above help expand the range of foreign contributors and improve the quality of foreign-language content by publishing articles with a higher citation potential in international indexes. An indicator of effectiveness of these activities is the presence of links from foreign authors in the journal. Promising areas of work to improve the journal's international visibility may be related to improving the quality of the metadata of papers and creating content that meets the needs of a global audience, expanding the program of participation in international scientific events, and increasing its distribution channels.

Conclusion

The results of the analysis of bibliometric indicators of Russian economic journals included in the Web of Science allowed us to identify factors that will negatively affect their position in the international space; in our opinion, the major factor is their small number. Since Russian economic journals have been included in WoS relatively recently, their international visibility is still low and the number of references from foreign publications is small. The bulk of citation is obtained from

Russian sources. Thus, the issue of increasing the citation level of Russian journals in international scientometric databases can be solved, on the one hand, by increasing the number of indexed Russian journals, and on the other hand, by improving their international visibility, expanding the foreign authors' audience, and publishing materials with high citation potential on issues relevant to the global academic community.

The dynamics of the main indicators of the journal *Economic and Social Changes: Facts, Trends, Forecast* indicates the effec-tiveness of the system approach that is used to solve key tasks to achieve compliance with all the requirements for a modern academic journal. The high values of the journal's impact factor in the RSCI allow us to conclude that it has become a well-known publication in the scientific community and that it has an impact on the development of economic science in Russia. Its wide popularity is confirmed by a significant number of citing scientific journals and the expanding geography of the composition of its authors, as evidenced by the low values of the Herfindahl indices. All this makes it possible to classify the journal as one of the leading Russian economic publications and determine its status as a national journal. The fact that it has been included in the main scientometric database proves that the high level of the journal is recognized not only among Russian economists, but also in the international academic community.

At the same time, the analysis of the journals' indicators in WoS has revealed a number of problems that should be addressed in order to strengthen its international position. The journal faces significant challenges in gaining a readership abroad and increasing its citation rate. Therefore, new tools and mechanisms will be needed to ensure the world-class quality of the publication, increase its accessibility and visibility in the international information space.

We believe that to improve the position of Russian economic journals in international scientometric databases, it is necessary to consolidate efforts on the part of the academic and editorial community. Certain conditions for this were created by the Association of Science Editors and Publishers (ASEP), chaired by O.V. Kirillova. Thanks to her efforts, the Section of Economic Journals was founded, which organizes specialized round tables in the framework of the annual conference "World-Class Scientific Publication". We can say that a platform has been created for conducting a professional conversation between representatives of the world's largest publishers, information and analytical resources, editors of economic journals, and economists. Although a number of issues in the field of improving the quality of economic journals are being successfully resolved, the presence of barriers that prevent their integration into the international space requires expanding the format of such events. One of the ways to address the issues may be to organize quarterly seminars that bring together (possibly online) leading experts in the field of editorial publishing, editors, reviewers, and authors. In addition, closer cooperation between the academic community and the Ministry of Science and Higher Education of the Russian Federation is required to develop system-wide measures to support domestic scientific periodicals, develop national bibliographic databases, and provide comprehensive incentives to leading journals included in international citation indexes.

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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 conducted by VolRC RAS in the Vologda Oblast[1].

The following tables show the dynamics of a number of parameters of social well-being and socio-political moods of the region's population based on the results of the last "wave" of monitoring (October – December 2019), as well as for the period from December 2018 to December 2019.

We compare the results of the surveys with the data for 2007 (the last year of V. 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 V. Putin's third presidential term).

We also provide yearly dynamics of the data for 2017–2019.

In October – December 2019, the level of approval of the work of the President of the Russian Federation did not change significantly: the share of positive assessments is 54%; the share of negative assessments is 30–31%.

A slight increase in the share of negative judgments about the work of the head of state is observed in the second half of 2019: for the period from June to December, it increased by 3 percentage points (from 28 to 31%).

In general, by the end of 2019, the level of approval of the work of the head of state has significantly decreased (compared to 2018, by 10 percentage points, from 66 to 56%); the share of negative assessments has increased by 8 percentage points (from 22 to 30%).

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[1] The polls are held six times a year in Vologda, Cherepovets, and in eight districts of the oblast (Babayevsky District, Velikoustyugsky District, Vozhegodsky District, Gryazovetsky District, Kirillovsky District, Nikolsky District, Tarnogsky District and Sheksninsky 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 Oblast's adult population. Sampling error does not exceed 3%.

More information on the results of VolRC RAS polls is available at http://www.vscc.ac.ru/.

For reference:

According to VTsIOM, the level of approval of work of the President of the Russian Federation in October — first half of December 2019 decreased from 65 to 63%, the share of negative judgments increased from 26 to 28%.

According to Levada-Center, in October — November 2019, the share of positive assessments of the work of the head of state decreased from 70 to 68%, and the proportion of negative evaluations increased from 29 to 31%.

In general, do you approve or disapprove of the work of the President of Russia? (% of respondents)
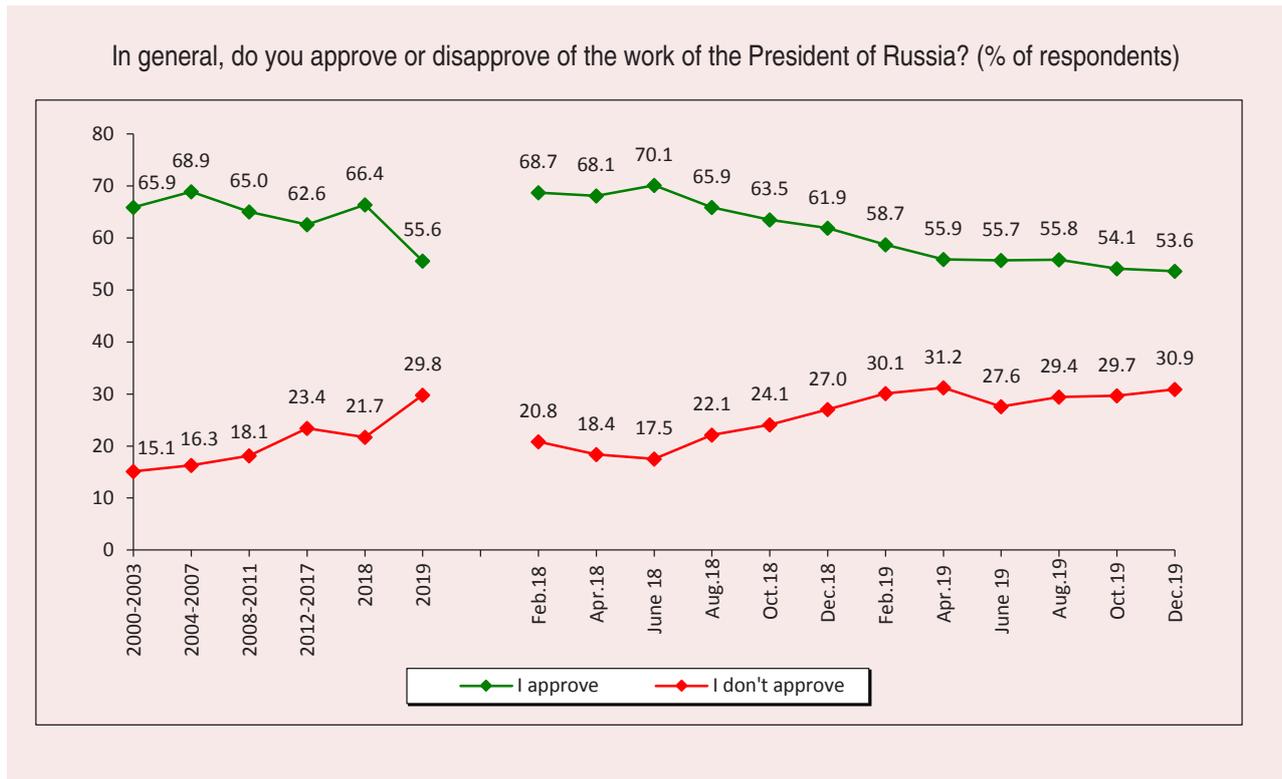
How do you assess the current performance of…? (% of respondents)

Answer	2007	2011	2012	2017	2018	2019	Dec. 2018	Feb. 2019	Apr. 2019	June 2019	Aug. 2019	Oct. 2019	Dec. 2019	Dynamics (+/-)	
														2019 to 2018	Dec. 19 to Oct. 19
RF President															
I approve	75.3	58.7	51.7	67.3	66.4	55.6	61.9	58.7	55.9	55.7	55.8	54.1	53.6	-10	-1
I don't approve	11.5	25.5	32.6	20.0	21.7	29.8	27.0	30.1	31.2	27.6	29.4	29.7	30.9	+8	+1
Chairman of the RF Government*															
I approve	-*	59.3	49.6	49.5	48.0	41.1	45.3	41.6	38.8	40.9	43.1	41.1	41.1	-7	0
I don't approve	-	24.7	33.3	31.1	31.6	38.4	36.9	39.3	40.2	38.0	36.3	37.5	38.9	+7	+1
Governor															
I approve	55.8	45.7	41.9	39.8	38.4	35.7	38.3	36.5	34.7	35.4	36.1	35.6	35.6	-3	0
I don't approve	22.2	30.5	33.3	39.3	37.6	40.2	40.3	41.5	41.4	38.6	38.5	40.1	40.8	+3	+1
* Included in the survey since 2008.															

Over the past two months, there have been no significant changes in the assessment of the success with which the President solves the country's key problems: 52% of residents of the Oblast positively assess the work of the head of state aimed at strengthening Russia's international positions, 44% positively assess his efforts aimed at restoring order in the country, 34% positively assess his efforts aimed at protecting democracy and strengthening the freedoms of citizens, 26% positively assess his efforts aimed at boosting the economy and increasing the welfare of the population.

At the same time, negative changes are observed at the end of 2019. For example, compared to 2018, there has been a decline in the proportion of those who believe that the President is doing well in the following spheres:

✓ strengthening Russia's international positions – by 3 percentage points (from 54 to 51%);
✓ restoring order in the country – by 7 percentage points (from 51 to 44%);
✓ protecting democracy and strengthening citizens' freedoms – by 7 percentage points (from 41 to 34%);
✓ boosting the economy and increasing citizens' welfare – by 3 percentage points (from 31 to 28%).

For the period from December 2018 to December 2019, the share of negative assessments of the population increased by 3 to 7 percentage points for all the issues appearing in the survey.

In your opinion, how successful is the RF President in coping with challenging issues?* (% of respondents)

Answer	2007	2011	2012	2017	2018	2019	Dec. 2018	Feb. 2019	Apr. 2019	June 2019	Aug. 2019	Oct. 2019	Dec. 2019	Dynamics (+/-)	
														2019 to 2018	Dec. 19 to Oct. 19
Strengthening Russia's international standing															
Successful	58.4	46.2	43.1	55.7	54.2	51.0	53.5	51.5	50.2	51.9	51.0	49.9	51.7	-3	+2
Unsuccessful	24.9	33.7	37.9	26.8	28.4	31.7	30.3	31.7	32.7	30.3	30.6	32.4	32.4	+3	0
Success index	133.5	112.5	105.2	129.0	125.7	119.4	123.2	119.8	117.5	121.6	120.4	117.5	119.3	-6	+2
Imposing order in the country															
Successful	53.2	36.6	35.4	50.6	51.1	44.1	46.9	44.2	42.4	44.5	46.1	43.1	44.1	-7	+1
Unsuccessful	34.0	50.0	50.7	36.1	35.0	40.3	39.5	40.7	42.6	39.3	39.3	40.0	39.7	+5	0
Success index	119.2	86.6	84.7	114.5	116.1	103.8	107.4	103.5	99.8	105.2	106.8	103.1	104.4	-12	+1
Protecting democracy and strengthening citizens' freedoms															
Successful	44.4	32.4	28.8	40.3	40.5	34.2	36.5	33.5	32.3	34.6	35.5	35.1	33.9	-6	-1
Unsuccessful	37.0	48.3	52.3	40.2	40.2	46.3	43.3	45.3	47.7	45.5	46.1	45.7	47.3	+6	+2
Success index	107.4	84.1	76.5	100.2	100.2	87.9	93.2	88.2	84.6	89.1	89.4	89.4	86.6	-12	-3
Economic recovery and increase in citizens' welfare															
Successful	47.2	30.7	28.5	29.3	31.0	27.5	29.9	28.1	28.1	29.1	26.5	26.9	26.1	-4	-1
Unsuccessful	39.1	56.1	57.9	56.9	56.2	58.5	57.6	56.9	58.2	57.8	59.7	58.2	60.0	+2	+2
Success index	108.1	74.6	70.6	72.4	74.7	69.0	72.3	71.2	69.9	71.3	66.8	68.7	66.1	-6	-3
* Ranked according to the average value of the index of success for 2018.															

In October – December 2019, the structure of people's political preferences has not changed: the level of support for the United Russia party is 33–34%, LDPR and KPRF – 8–9%, the Just Russia party – 4%.

At the end of 2019, two changes should be noted:

1. Reduction in support for United Russia (by 4 percentage points, from 38 to 34%).

2. Increase in the share of people who believe that none of the political forces represented in Parliament expresses their interests (by 5 percentage points, from 29 to 34%).

Which party expresses your interests? (% of respondents)

Party	2007	2011	Election to the RF State Duma 2011, fact	2012	2016	Election to the RF State Duma 2016, fact	2017	2018	2019	Dec. 2018	Feb. 2019	Apr. 2019	June 2019	Aug. 2019	Oct. 2019	Dec. 2019	Dynamics (+/-) 2019 to 2018	Dec. 19 to Oct. 19
United Russia	30.2	31.1	33.4	29.1	35.4	38.0	34.7	37.9	33.8	36.0	34.6	33.3	34.8	33.5	32.8	33.7	-4	+1
LDPR	7.0	10.3	16.8	10.6	8.3	14.2	7.6	9.2	8.8	9.9	9.1	8.0	8.5	8.7	9.1	9.2	0	0
KPRF	7.5	7.8	15.4	7.8	10.4	21.9	11.0	9.6	9.1	8.8	8.9	8.2	9.1	10.5	8.3	9.4	-1	+1
Just Russia	7.8	5.6	27.2	6.6	4.2	10.8	4.8	2.9	3.4	2.8	2.9	2.9	2.5	3.9	4.2	4.0	+1	0
Other	1.8	1.9	–	2.1	0.3	–	0.5	0.7	0.3	0.4	0.6	0.3	0.3	0.4	0.1	0.1	0	0
None	17.8	29.4	–	31.3	29.4	–	29.2	28.5	33.7	31.9	34.2	34.7	32.3	32.1	34.3	34.3	+5	0
It's difficult to answer	21.2	13.2	–	11.7	12.0	–	12.2	11.2	11.0	10.2	9.7	12.6	12.4	10.9	11.2	9.3	0	-2

The estimates of social well-being of the population show no significant changes either in the short-term (for the last two months) or in the long-term (for 2019) retrospective:

✓ most residents of the Oblast positively characterize their daily emotional state (70%) and say that "everything is not so bad and we can live" (78%);

✓ the proportion of people who subjectively refer to themselves as "middle-class" citizens is stable at 41–42%; however, it is significantly lower than the proportion of those who consider themselves to be "poor" and "extremely poor" (47 – 48%). it should also be noted that during the period from December 2018 to December 2019, the share of "poor and extremely poor" residents of the region increased by 4 percentage points (from 44 to 48%);

✓ the consumer sentiment index in 2019 was 91 points, at the same time, in the last two months, it has slightly decreased (from 92 to 90 points), which indicates a deterioration in people's forecasts regarding the future economic situation in the country and their personal financial situation.

Estimation of social condition (% of respondents)

Answer	2007	2011	2012	2017	2018	2019	Dec. 2018	Feb. 2019	Apr. 2019	June 2019	Aug. 2019	Oct. 2019	Dec. 2019	Dynamics (+/-) 2019 to 2018	Dynamics (+/-) Dec. 19 to Oct. 19
Mood															
Usual condition, good mood	63.6	63.1	67.3	70.4	71.2	69.9	70.7	68.0	68.8	71.4	70.9	70.3	69.7	-1	-1
I feel stress, anger, fear, depression	27.8	28.9	27.0	24.2	23.1	24.5	23.5	25.6	25.5	23.5	23.4	24.0	25.0	+1	+1
Stock of patience															
Everything is not so bad; it's difficult to live, but it's possible to stand it	74.1	74.8	76.6	77.7	77.1	77.0	77.1	74.3	76.7	78.0	76.8	77.8	78.4	0	+1
It's impossible to bear such plight	13.6	15.3	15.8	15.8	16.3	17.2	17.5	19.1	17.5	16.5	16.2	17.2	16.7	+1	-1
Social self-identification*															
The share of people who consider themselves to have average income	48.2	43.1	44.7	43.1	42.3	42.4	41.6	43.8	41.3	43.3	42.9	41.4	41.4	0	0
The share of people who consider themselves to be poor and extremely poor	42.4	44.3	44.5	46.6	45.4	46.8	44.7	44.8	46.9	45.8	47.0	48.0	48.4	+1	0
Consumer sentiment index															
Index value, points	105.9	89.6	91.5	84.6	89.9	90.9	89.1	90.1	90.0	91.2	91.8	92.0	90.3	+1	-2
* Question: "Which category do you belong to, in your opinion?"															

In the context of the main socio-demographic groups, there have been no significant changes in the social mood over the past two months, except for those with secondary vocational education (a decline in the share of positive ratings by 4 percentage points, from 74 to 70%), and residents of the Oblast who according to self-evaluations of their income belong to 20% of the least secured strata (in this group, the proportion of positive judgments also declined by 4 percentage points, from 54 to 50%).

At the same time, in the group of the bottom 20%, there is also the most significant deterioration in social mood estimates for the period from December 2018 to December 2019 (by 11 percentage points, from 61 to 50%).

In general, no positive changes were observed in any of the analyzed socio-demographic groups at the end of 2019. There were no significant changes in nine groups, in five groups there was a decrease in the share of positive assessments of social mood (especially significant among people with higher and incomplete higher education — by 4 p.p., from 77 to 73%; among the top 20% of the residents of the Oblast — by 4 p.p., from 57 to 53%; and among residents of Cherepovets — by 5 p.p., from 76 to 71%).

Social mood in different social groups (answer: "Good mood, normal condition", % of respondents)

Population group	2007	2011	2012	2017	2018	2019	Dec. 2018	Feb. 2019	Apr. 2019	June 2019	Aug. 2019	Oct. 2019	Dec. 2019	Dynamics (+/-) 2019 to 2018	Dynamics (+/-) Dec. 19 to Oct. 19
Sex															
Men	65.9	64.5	69.1	70.6	72.8	70.1	73.4	69.9	68.6	72.1	71.8	69.2	69.0	-3	0
Women	61.7	62.0	65.8	70.2	69.8	69.6	68.4	66.4	69.0	70.8	70.1	71.2	70.3	0	-1
Age															
Under 30	71.3	70.0	72.3	78.1	80.0	81.1	81.6	76.3	81.2	82.9	85.2	79.9	81.3	+1	+1
30-55	64.8	62.5	67.9	71.5	72.6	71.2	71.6	68.0	71.5	70.5	74.0	71.1	71.9	-1	+1
Over 55	54.8	58.3	62.1	64.9	65.2	63.3	64.7	64.3	59.8	67.4	60.7	65.1	62.6	-2	-2
Education															
Secondary and incomplete secondary	58.4	57.4	57.2	63.6	64.8	63.2	67.8	61.5	60.4	64.4	65.6	63.4	64.0	-2	+1
Secondary vocational	64.6	63.6	66.7	72.0	72.2	72.7	70.5	68.6	73.0	77.3	72.8	73.9	70.4	+1	-4
Higher and incomplete higher	68.6	68.3	77.0	75.8	76.8	73.4	74.1	73.8	73.3	72.1	73.9	72.6	74.7	-3	+2
Income groups															
Bottom 20%	51.6	45.3	51.5	52.9	57.3	53.2	61.3	50.4	56.1	54.9	53.2	54.1	50.2	-4	-4
Middle 60%	62.9	65.3	68.7	72.0	71.9	71.4	69.7	67.2	69.9	74.1	72.1	72.6	72.6	-1	0
Top 20%	74.9	75.3	81.1	83.7	82.9	81.8	83.4	86.2	81.0	81.0	81.4	80.5	80.5	-1	0
Territories															
Vologda	63.1	67.1	73.6	72.6	71.0	68.6	67.1	65.5	68.5	70.3	68.0	70.8	68.6	-2	-2
Cherepovets	68.1	71.2	76.2	75.7	75.8	71.2	74.5	71.1	67.8	72.1	74.4	72.0	69.9	-5	-2
Districts	61.6	57.1	59.8	66.1	68.7	69.8	70.5	67.6	69.6	71.7	70.5	69.0	70.3	+1	+1
Oblast	63.6	63.1	67.3	70.4	71.2	69.9	70.7	68.0	68.8	71.4	70.9	70.3	69.7	-1	-1

Conclusion

According to the results of 2019, the dynamics of public sentiments of residents of the Vologda Oblast show mainly negative changes. This applies to the assessment of the work of federal state authorities (compared to 2018, the level of approval of the President's work decreased by 10 p.p., from 66 to 56%; the Prime Minister's work − by 7 p.p., from 48 to 41%), as well as support for the United Russia party (the share of people who believe that the party in power expresses their interests for 2018−2019 decreased by 4 p.p., from 38 to 34%).

We should also note that over the past year, the assessments of the success of the President's work aimed at solving the country's key problems deteriorated (by 3−7 p.p.); there have been no positive changes in the dynamics of social mood in any of the socio-demographic groups.

Assessments of the performance of the Vologda Oblast Governor remain relatively stable compared to 2018: the level of approval is 36−38%. Various indicators of social well-being remain stable as well: the proportion of people who positively characterize their daily emotional state remained at the level of 70−71%, the share of Vologda Oblast residents who think that "it's not so bad and we can live" remains at the level of 77% in recent years.

The dynamics of self-assessments of the financial situation in 2019 can be interpreted in different ways: on the one hand, there were no negative changes in it (which, in principle, is a

good result, if we take into account the deterioration of assessments regarding the work of the authorities). On the other hand, it is difficult to characterize it positively: the share of "poor" and "extremely poor" residents exceeds the share of people of "average income" (47 and 42%, respectively), and the consumer sentiment index remains below 100 points (90—91 p.p.), which indicates the prevalence of pessimistic forecasts of the population regarding the future of the Russian economy and their personal financial situation.

It is important to emphasize that the trends in public opinion observed in the Vologda Oblast are not unique to the region. In particular, the leading Russian centers engaged in sociological surveys record a drop in the level of approval of the President's work: according to VTsIOM, for the period from 2018 to the 1st half of December 2019, it decreased by 7 p.p. (from 71 to 64%), according to Levada-Center (for 2018 — November 2019) — by 6 p.p. (from 73 to 67%). According to the Institute of Sociology of the Russian Academy of Sciences (IS RAS), the level of trust in the head of state in 2017 was 71%, in 2018 — 69%, in 2019 — 57%[2].

The ratings of the United Russia party (according to VTsIOM) in early 2018 fluctuated in the interval of 45—50%; in the second half of 2018 (after the announcement of the pension reform) — 35—39%, in 2019 — in the interval of 32—34%.

The consumer sentiment index (according to Levada-Center) was 78 points in 2018 and 79 points in 2019.

In our view, the deterioration in the assessments of the work of federal authorities in 2019 is not so much due to their adoption of some management decisions that fundamentally differ from the opinion of the population (as was the case with the pension reform in 2018), but rather to the unjustified expectations of people regarding the implementation of simple, concrete and non-discriminatory promises voiced by V. Putin in his Address to the Federal Assembly of the Russian Federation in 2018 and later enshrined in the May Decree and national projects.

According to the Federal State Statistics Service, in 2018, the real disposable income of the population of the Vologda Oblast amounted to 99.4% of the level of the corresponding period of 2017, and in January — September 2019, the value of this indicator decreased to 99.1%. Real accrued wages in 2018 amounted to 109.1% of the level of 2017, and in January — September 2019 — to 103.7% of the corresponding period of 2018[3]... In other words, neither people's subjective assessments nor any real trends in living standards recorded in official statistics show any signs of "twofold reduction in poverty" that people are waiting for so much; although the mass media regularly inform people about "multibillion" financial resources allocated to the implementation of projects, support of certain sectors, etc.

Vladimir Putin noted at one of the meetings on the implementation of national projects: "People are not interested in abstract promises; citizens are interested in the result, and not in the distant future, but now"[4]. We think that the results of Russian and regional public opinion

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[2] *Russian society after the presidential election-2018: request for change: an information and analytical report.* Moscow, 2018. P. 35; *On the pressing problems of our life and the interaction of regulators, business and citizens: a report on the results of a mass sociological study.* Moscow, 2019. Vol. 1. P. 82.

[3] *Socio-economic situation of the Vologda Oblast in January-October 2019: report.* Vologdastat. Vologda, 2019. Pp. 64-65.

[4] Meeting of the Council for Strategic Development and National Projects on May 8, 2019. Available at: http://www.kremlin.ru/events/president/news/60485

surveys convincingly prove this thesis of the head of state. The fact that the negative dynamics of perception of the work of federal government agencies, as well as the stable alarming situation with regard to the financial situation of the population, are not accompanied by a decrease in social well-being indicators, only proves that people rely on the help of the state less and less, and the gap between them and the state is thus increasing.

Under the circumstances, the attitude of society toward the authorities will be determined primarily by positive changes in the dynamics of living standards and overcoming social inequality, such as inequality not only in terms of income, but also in terms of employment opportunities, education, quality medical care, etc. it is highly likely that this issue will become more relevant as the results of national projects are "delayed" and the State Duma election of 2021 and the presidential election of 2024 are getting closer.

The materials were prepared by M.V. Morev, I.V. Paranicheva, I.M. Bakhvalova

Index of articles published in 2019

	Issue	Pages
Editorial		
Ilyin V.A., Morev M.V. "Intellectual Feebleness" of the Ruling Elites and the "Deep People" of the "Long State"	2	9–35
Ilyin V.A., Morev M.V. Nationally Oriented Rotation of the Elites – the Most Important Condition for the Implementation of National Projects	4	9–25
Ilyin V.A., Morev M.V. Public Administration Efficiency in 2000–2018 in the assessments of the Region's Population	1	9–38
Ilyin V.A., Morev M.V. The Problem of Civilizational Choice and Its Reflection in the Key Documents Defining the Present and Future of Russia	3	9–23
Public Administration Efficiency **Editorial**		
Ilyin V.A., Morev M.V. Civil Society and the Transit of Power in 2024	6	9–26
Ilyin V.A., Morev M.V. The 2018–2019 Regional Election: Voters' Trust in the Authorities Continues to Decline	5	9–24
Socio-Economic Development Strategy		
Kudryashova E.V., Zarubina L.A., Sivobrova I.A. CrossBorder Investment Cooperation in the Arctic Region: Challenges and Opportunities	1	39–52
Lavrikova Yu.G., Andreeva E.L., Ratner A.V. Localization of Foreign Production as a Tool to Develop the Export Base of the Russian Federation	3	24–38
Motrich E.L., Molodkovets L.A. Shaping the Population and Labor Resources in the Russian Far East	1	53–69
Sukharev O.S. Technological Development: Investment Structure Impact	2	36–55
Charushin V.N., Lavrikova Yu.G., Akberdina V.V. Research Potential of the Ural Branch of the Russian Academy of Sciences as a Strategic Factor in Regional Development	6	51–73
Public Administration Efficiency		
Minakir P.A., Leonov S.N. Regional Public Debt: Trends and Formation Specifics	4	26–41
Regional Economy		
Izotov D.A. Inflow of Foreign Direct Investments in Russia's Regions: Potential and Risk Factors	2	56–72
Kargapolova E.V., Dulina N.V. Modernization of a Region as a Heterarchical System	1	70–86
Kozhevnikov S.A. Problems of the European North of Russia and the Possibilities of Its Participation in the Development of the Arctic Zone of the Russian Federation	1	87–107
Mel'nikov A.E. Investment Processes and Structural Changes in the Economy of Old Industrial Regions of the Northwestern Federal District	2	91–102
Stepanova V.V., Ukhanova A.V., Grigorishchin A.V., Yakhyaev D.B. Evaluating Digital Ecosystems in Russia's Regions	2	73–90
Shakleina M.V., Midov A.Z. Strategic Classification of Regions According to the Level of Financial SelfSufficiency	3	39–54
Gubanova E.S., Kleshch V.S. Overcoming SocioEconomic Inequality as a Condition for Sustainable and Balanced Spatial Development of the Region	5	44–57

AUTHOR GUIDELINES
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The following materials are submitted to the editorial office in electronic form:

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2. Full information about the author on a separate page: full name, academic degree and title, place of work and position, contact information (postal address, telephone, e-mail – if available), ORCID, Researcher ID. The information should be arranged in a table.

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Right – 1 cm, others – 2 cm.

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Font size of the article's text – 14, type – Times New Roman (in case a special type font is needed, when typing Greek, Arab, etc. words, Windows default fonts are to be used). In case the paper contains seldom used fonts, they (font family) are to be submitted along with the file. Line interval – 1,5.

3. Indent – 1.25. Made automatically in MS Word.

4. Numbering

Page numbers are placed in the lower right corner of the page automatically with the use of MS Word tools.

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In the upper right corner, the UDC is placed, under it, after the 1.5 spacing — the LBC, then — the symbol ©, indent (spacing), and the name and initials of the author in semi-bold. After the 2-spacing indent, the title of the article is given. Central alignment is used for the title of the article given in semi-bold. The abstract and key words are given below, after the 2-spacing indent, without a paragraph indent, in italics and aligned by width. Then, after the 2-spacing indent, the text of the article is placed.

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The abstract contains from 200 to 250 words. The abstract states the purpose of the research, points out its undoubted scientific novelty and its differences from similar works of other scientists; contains the methods used by the author and the main results of the work performed; identifies areas of application of the results of the study; briefly formulates the prospects for further research in this area.

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7. Key words

There should be not more than eight words or word combinations. Key words should reflect the content of the manuscript to the fullest extent. The number of words within a phrase should not exceed three.

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The caption of the table and its number (if present) are given in normal font, without highlighting. The caption runs in bold and is center aligned.

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10. Bibliographic description of the sources under tables and figures

Write: either "Source", or "Compiled with the use of", or "Calculated with the use of", etc., after that − information about the source.

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Page footnotes are executed according to GOST R 7.0.5 − 2008.

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[1] Information about the modified Harvard standard is given in the book: Kirillova O.V. *Redaktsionnaya podgotovka nauchnykh zhurnalov po mezhdunarodnym standartam: rekomendatsii eksperta BD Scopus* [Editorial Preparation of Scientific Journals according to International Standards: Recommendations of a Scopus Expert]. Moscow, 2013. Part 1. 90 p.

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