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FACTS, TRENDS, FORECAST

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ECONOMIC AND SOCIAL CHANGES: FACTS, TRENDS, FORECAST

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

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

Founder: Vologda Research Center of the Russian Academy of Sciences

Federal State Budgetary Institution of Science Vologda Research Center of the Russian Academy of Sciences (VolRC RAS), 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 agreement is signed with Jiangxi Academy of Social Sciences (China, 2014).

NEW PUBLICATIONS OF VolRC RAS

Ilyin V.A., Povarova A.I. *Public Administration Efficiency. 2000–2015. Contradictory Outcomes – an Expected Result: Monograph*.

While Analyzing the Past, to Think about the Future. Under the scientific supervision of Doctor of Economics, Professor V.A. Ilyin.

Ilyin V.A. *Public Administration Efficiency: Chief Editor's Point of View.*

Strategy and Tactics of Implementation of Socio-Economic Reforms: Regional Aspect: Proceedings of the Seventh Research-to-Practice Conference, Vologda, Russia, December 17–19, 2015.

Shabunova A.A., Guzhavina T.A., Dement'eva I.N., Kozhina T.P., Lastovkina D.A., Afanas'ev D.A. *Regional Civil Society: Development Dynamics: Monograph*.

Global Challenges and Regional Development in the Mirror of Sociological Measurement: Proceedings of the Online Research-to-Practice Conference. Vologda, March 14–18, 2016.

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EDITORIAL

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Public Administration Efficiency in 2000–2018 in the Assessments of the Region's Population*

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Abstract. Previous issues of our journal contain editorials devoted to the most acute issues of Russia's modern life and its future. Using expert assessments and the results of international, national and our own research, we touched upon key aspects of public administration efficiency in addressing the issues that ensure national security. These tasks are as follows: overcoming social inequality and "capitalism for the few", ensuring the stability of the psychological state of society and promoting civic engagement of its main strata. We analyzed the state of affairs in science and education, in the economy and social sphere; we gave an objective assessment of the President's key speeches and analyzed how effectively the Government was implementing the President's orders (including those that were set out in the "May decrees"). We covered the most resonant events happening in the internal and international political arena. In the context of national security, we analyzed the correlation of interests of the general population and

* The paper presents the data of the public opinion monitoring conducted by VolRC RAS (1998 – February 2019).

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the elite. On repeated occasions, we considered the historical experience of Russia and foreign countries, drew analogies between the past and the present, trying to answer the question of how well the ruling elite learns the lesson and promotes sustainable development of the country in order to handle the increasingly complex conditions of global competition in the 21st century.

We should point out that, as the President himself has repeatedly noted, public opinion is the main criterion that determines the success of the work of the government and public administration efficiency, and influences the changes in the situation in the country. At the same time, the beginning of 2019 can be seen as a starting point in the implementation of the main provisions of the May 2018 Decree and, more broadly, in the implementation of the targets for the breakthrough development of the internal, primarily socio-economic, situation in Russia. Achieving these goals is a keynote of the new political cycle and the last (according to the current Constitution of the Russian Federation) presidential term of Vladimir Putin.

We decided to begin the first 2019 issue of the journal *Economic and Social Changes: Facts, Trends, Forecast* by analyzing key trends in people's subjective assessments concerning various aspects of everyday life over the past 18 years, including the dynamic changes taking place in the assessment of the work of public authorities, in the perception of living standards and the quality of life, and in the emotional and psychological background in society. The main information source that allows us to implement such a task is the sociological monitoring conducted by VolRC RAS on the territory of the Vologda Oblast for more than 20 years (since 1996).

The following tables show trends in a number of parameters of social well-being and socio-political sentiment of the Vologda Oblast residents in the long-term (annual) retrospective, as well as current (last six waves of the monitoring) changes in public opinion.

When analyzing current trends in public opinion, we place an emphasis on the results of V. Putin's third presidential term (2012–2017) and on the current dynamics of people's estimates (the latest six surveys: April 2018 – February 2019). These results show how well the head of state is able to build a system of public administration at all levels (federal, regional, municipal) in accordance with the goals noted in his Address to the Federal Assembly of the Russian Federation and set out in the May 2018 Decree and also in accordance with the task of effective transit of Russian statehood for the period up to 2024, the task that is strategically important for national security.

Key words: public opinion, assessment of performance of the authorities, President, social sentiment, results of the year.

[1] See, for example:

1. On assessing the effectiveness of the work of the executive authorities of the Russian Federation: transcript of the conference call. January 10, 2012. Available at: http://archive.government.ru/special/docs/17719/

2. Vladimir Putin's speech at the meeting of the Presidential Commission on monitoring the achievement of socio-economic development targets of the Russian Federation, May 7, 2014. Available at: http://www.kremlin.ru/events/president/news/20974

3. The President's address to the nation on August 29, 2018. *Official Website of the Russian President*. Available at: http://www.kremlin.ru/events/president/news/58405

I. Dynamics of public opinion concerning the performance of the authorities and the situation in the country

According to the findings of our research, despite the numerous facts indicating that Dmitry Medvedev's Government does not implement the May 2012 Decrees efficiently[2], people's assessment of Vladimir Putin's performance during his third presidential term (2012–2017)[3] improved: the share of positive judgments increased from 52 to 67%, and the share of negative judgments decreased from 33 to 20% *(Insert 1, Fig. 1)*. The key event that influenced the positive dynamics of public opinion was the accession of Crimea and Sevastopol to the Russian Federation, the move that was supported by the vast majority of Russians. Thus, in 2014, there was an abrupt "surge" in the level of approval of the head of state (by 9 percentage points, from 55 to 64%).

In March 2018, on the eve of the presidential election, in his Address to the Federal Assembly, Vladimir Putin outlined what the key vector of the country's development for the period up to 2024 would be if he were elected President once again. The statement that "everything hinges on efforts to preserve the people of Russia and to guarantee the prosperity of our citizens We must achieve a decisive breakthrough in this area"[4] was perceived by Russians with a high degree of optimism: according to the Federal Sociological Research Center of the Russian Academy of Sciences (FSRC RAS), more than 90% of Russians noted the importance of thefollowing tasks set out in the Presidential Address: "increasing life expectancy to 80 years", "Russia joining the five largest economies of the world and securing its position among them", "renewal and development of Russian cities taking into account the opinion of their residents", "forming equal educational opportunities", "creating modern infrastructure in rural areas", "raising pensions, their indexation above the rate of inflation", "repairing regional and local roads", "affordable and high-quality medical care", "raising real incomes of the working population"[5].

At the presidential election held on March 18, 2018, Russian society demonstrated a significant increase in the level of support for the current head of state and in voter turnout: compared to the presidential election of 2012, the turnout in Russia increased from 65.34 to 67.54%, and the support for Vladimir Putin – from 63.60 to 76.69% (for comparison: only 11.77% of Russians voted for P. Grudinin, who was on the second place according to the number of votes he received).

On May 7, 2018, Vladimir Putin officially assumed office as President of the Russian Federation and in his inauguration speech he

[2] See, for example:

1. Volkova O., Nikolskaya P., Tkachev A., Mogilevskaya A. Promises of the third term: how the May Decrees of the President are executed. *RBK website*. Available at: http://www.rbc.ru/economics/17/05/2016/573a034a9a7947d18967193a

2. Ilyin V.A., Morev M.V. "Russian Federation – a welfare state?": assessing the results of 25 years of implementation of Article 7 of the Russian Constitution. *Economic and Social Changes: Facts, Trends, Forecast,* 2018, vol. 11, no. 6, pp. 9-25.

3. The disciplining essence of the May Decrees (editorial). *Nezavisimaya gazeta,* 2018, May 16. Available at: http://www.ng.ru/editorial/2018-05-16/2_7225_red.html

4. Sheinis V.L. Historical transit: Russian drama. *Nezavisimaya gazeta,* 2017, January 27. Available at: http://www.ng.ru/ideas/2017-01-27/5_6914_drama.html

5. It will cost five thousand rubles to obtain an international passport: why so expensive. *Moskovskii komsomolets,* 2018, June 19 (an opinion of Finam analyst A. Korenev). Available at: http://www.mk.ru/social/2018/06/19/oformlenie-zagranpasporta-oboydetsya-v-5-tysyach-rubley-pochemu-tak-dorogo.html

[3] Here and further, we provide the following periodization of presidential terms for the analysis of public opinion:

2000–2003 – V. Putin's first presidential term (four years, including the last full year of the first presidential term);

2004–2007 – V. Putin's second presidential term (four years, including the last full year of the second presidential term);

2008–2011 – D. Medvedev's presidential term (four years, including the last full year of D. Medvedev's presidential term);

2012–2017 – V. Putin's third presidential term (six years, including the last full year of the third presidential term);

2018 – the beginning of V. Putin's fourth presidential term.

[4] Presidential address to the Federal Assembly. March 1, 2018. *Official Website of the President of the Russian Federation*. Available at: http://www.kremlin.ru/events/president/news/56957

[5] Filina O. Birds in the hand turned into birds in the bush: what Russians think about the feasibility of strategic tasks of the state. *Kommersant,* 2018, May 28. Available at: https://www.kommersant.ru/doc/3635558

once again confirmed his intentions regarding development plans for the period up to 2024, stating that **"now, we must use all the opportunities available to us primarily to address the most vital domestic development objectives, to achieve an economic and technological breakthrough, and to enhance competitiveness in the spheres that determine the future. A new quality of life, wellbeing, security and health are what constitutes our main goals and the focus of our policies"[6].** The President addressed these words not so much to the Russian society that elected him, as to the ruling elites, and his words set a clear vector of state policy for the next six years.

At the same time, the first nine months of V. Putin's fourth presidential term (from June 2018 to February 2019) were marked by reforms that were negatively perceived by society. A special resonance was caused by the project of raising the retirement age, which catalyzed a number of mass protests across the country, largely due to the fact that the reform itself was carried out as a "covert operation", without organizing a preliminary broad discussion with the people.

It should be noted that raising the retirement age is not the first case of such a practice of "shock therapy". Monetization of benefits (2005) and the reform of RAS (2013) were carried out the same way... In the case of the pension reform, the issue became "routine"[7], and it was facilitated by V. Putin's speech on federal TV channels (August 29, 2018), in which he spoke directly to the citizens of Russia and tried to explain the necessity and timeliness of this step, and also made a number of amendments to the draft law of the reform, significantly facilitating its course for many categories of the population.

> **N. Zubarevich:** "They should have taken progressive steps and make comprehensive and well-thought-out decisions, but instead they did nothing for 15 years and then resolved the matter at once. In all countries, raising the retirement age has been a matter of public debate, and this reform is introduced gradually... Raising the retirement age is inevitable, it is not a reform, it is a fiscal measure to remove the burden from the federal budget, **but it was done outrageously, like a blow on the head...** What does a special operation mode mean? It means that first something is launched without any discussions, like a bolt out of the blue, as it was the case with the monetization of benefits. And then if any protests arise, this measure is revised. The monetization of benefits was supported by the additional flow of money, so that people did not take to streets. And now it is all done like in a two-move scheme: first they establish the retirement age at 65 for men and 63 for women; in the end, it will be 60 for women and 63 for men. It is a common political move – the Government is bad, the President is good"[8]

In October 2018, the relevant law on amending pension legislation was adopted[9], however, according to the results of the monitoring, neither the law nor the President's televised address to the people was able to ensure the return of a positive trend in the dynamics of public opinion: from June 2018 (when the draft pension reform was first presented to the Russians) and up to the present, people's support for V. Putin has been declining by 2–4 percentage points every two months, and in general it decreased from 70 to 59% over the last five "waves" of the survey.

It is important to emphasize that by the end of 2018, the deterioration in the assessment of the President's work was noted in all socio-demographic

[6] Vladimir Putin's inauguration speech on May 7, 2018. *Official Website of the President of the Russian Federation*. Available at: http://www.kremlin.ru/events/president/news/57416

[7] *Trust ratings of politicians; ratings of approval of the work of state institutions; ratings of the parties: VTsIOM press release*, 2018, no. 3788, October 12. Available at: https://wciom.ru/index.php?id=236&uid=9363 (comment by M. Mamonov, head of the practice of political analysis and consulting at the research department).

[8] Materials of an interview with N. Zubarevich, director of the regional program at the Independent Institute for Social Policy (source: Kostareva A. Pension reform – a special operation in the emergency mode. Available at: https://www.discred.ru/2018/07/18/pensionnaya-reforma-spetsoperatsiya-v-rezhime-avrala/).

[9] On amending certain legislative acts of the Russian Federation on the issues of assignment and payment of pensions: Law No. 350 dated October 3, 2018.

Insert 1

Figure 1. How would you assess the current performance of the Russian President? (% of respondents)

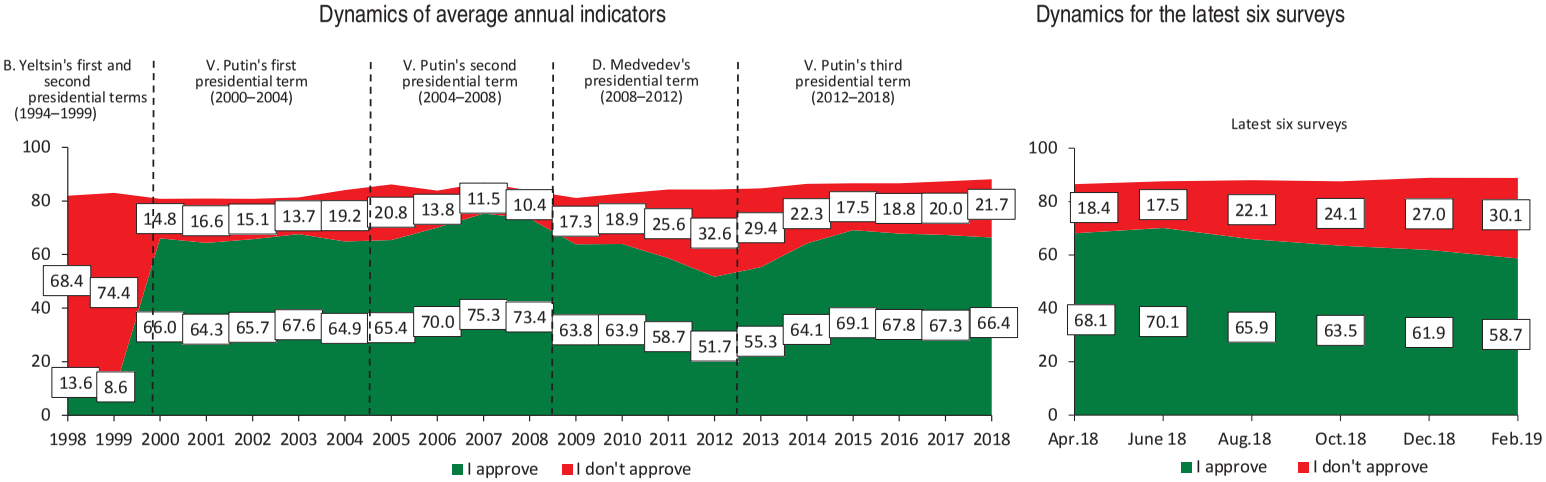


Table 1. How would you assess the current performance of the Russian President? (answer: I approve completely and in in general, % of respondents)

Dynamics of average estimates broken down by V. Putin's and D. Medvedev's presidential terms

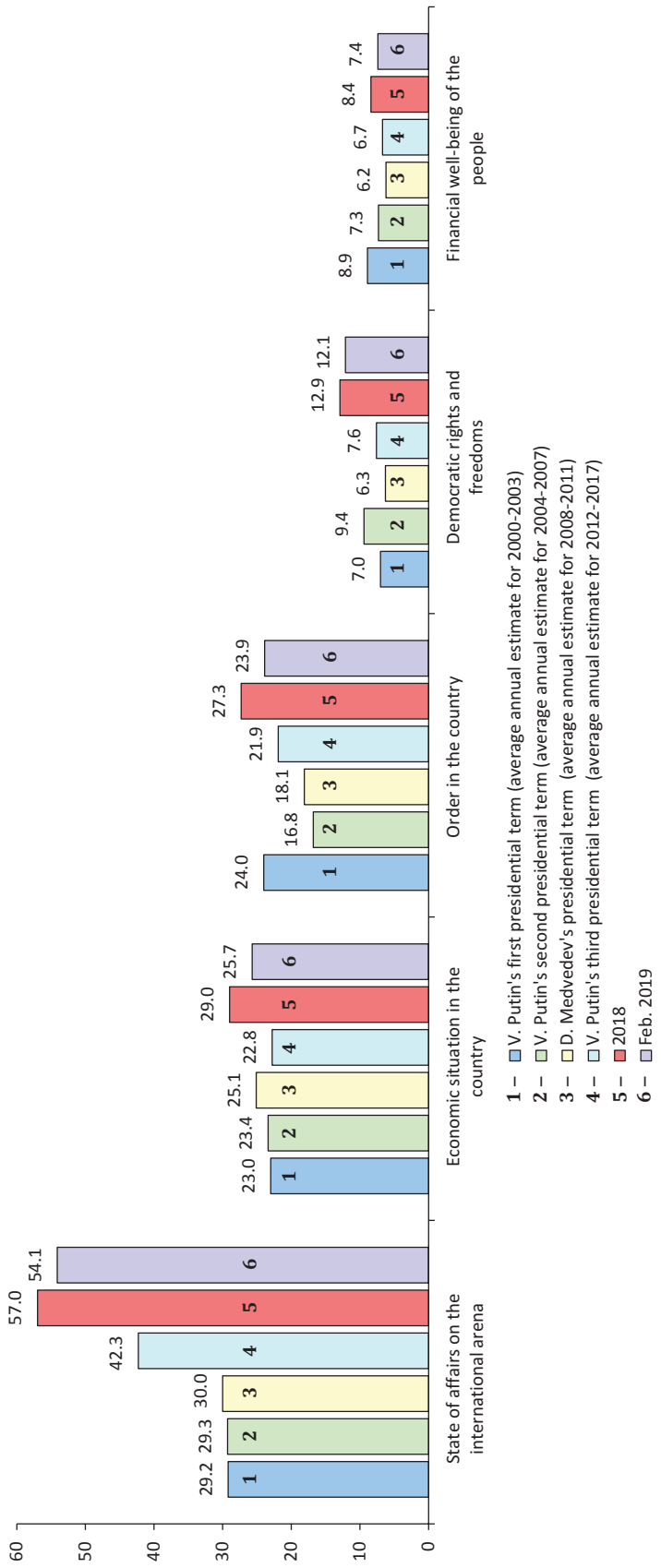
Populatiion group	Average annual estimate for 2000–2003	Average annual estimate for 2004–2007	Average annual estimate for 2008–2011	Average annual estimate for 2012–2017	Average annual estimate for 2018	Dynamics of average annual estimates (+/-)			
						2012–2017 to 2000–2003		2018 to 2012–2017	
						+	-	+	-
Sex									
Men	65.8	69.0	63.1	59.6	64.0		-6	+4	
Women	66.0	68.9	66.5	64.9	68.3		-1	+3	
Age									
Under 30	68.8	70.7	64.7	61.2	63.0		-8	+2	
30-55	65.2	68.6	64.4	61.4	64.8		-4	+3	
Over 55	64.4	67.9	66.0	5.1	69.9	+1		+5	
Education									
Secondary and incomplete secondary	61.9	65.3	60.4	56.9	58.0		-5	+1	
Secondary vocational	66.6	70.2	65.8	63.8	70.0		-3	+6	
Higher and incomplete higher	70.1	71.9	69.1	67.2	70.3		-3	+3	
Income groups									
Bottom 20%	55.4	60.8	55.4	50.2	9.9		-5	0	
Middle 60%	68.3	71.4	66.7	64.8	68.8		-4	+4	
Top 20%	73.2	76.5	72.7	71.9	76.4		-1	+5	
Territories									
Vologda	66.2	65.3	64.5	61.1	62.5		-5	+1	
Cherepovets	64.6	72.5	73.8	74.1	78.1	+10		+4	
Districts	66.5	68.8	60.7	56.9	6.8		-10	+5	
Oblast	**65.9**	**68.9**	**65.0**	**62.5**	**66.4**		**-3**	**+4**	

Dynamics for the latest six surveys

Populatiion group	Apr. 2018	June 2018	Aug. 2018	Oct. 2018	Dec. 2018	Feb. 2019	Dynamics (+/-), Feb.19 to Apr.18	
							+	-
Sex								
Men	62.6	69.6	63.1	62.6	59.9	56.8		-6
Women	72.5	70.5	68.2	64.3	63.5	60.1		-12
Age								
Under 30	60.8	66.0	66.8	62.0	56.6	56.3		-5
30-55	66.5	70.3	64.0	61.5	58.9	56.7		-10
Over 55	73.6	71.7	67.9	66.9	67.9	62.2		-11
Education								
Secondary and incomplete secondary	58.5	60.9	60.9	57.8	52.2	49.3		-9
Secondary vocational	72.2	75.6	69.1	66.6	64.9	62.3		-10
Higher and incomplete higher	72.9	72.0	66.7	65.3	68.2	62.8		-10
Income groups								
Bottom 20%	51.5	52.7	50.5	46.7	43.5	46.0		-6
Middle 60%	74.1	72.3	66.4	65.5	64.9	59.2		-15
Top 20%	70.5	78.9	80.1	75.0	73.1	65.9		-5
Territories								
Vologda	63.8	65.5	61.7	60.5	57.9	54.7		-9
Cherepovets	79.8	82.9	78.4	74.4	70.8	66.5		-13
Districts	63.9	65.3	61.1	59.0	59.0	56.3		-8
Oblast	**68.1**	**70.1**	**65.9**	**63.5**	**61.9**	**58.7**		**-9**

Insert 2

Figure 2. In your opinion, what is V. Putin primarily concerned with?
(% of respondents, excluding the answers: "other" and "it's difficult to answer")



groups, including those that are traditionally most positive – young people and the residents of the region who assess their income as high *(Insert 1, Table 1)*. Thus, from April 2018 to February 2019, the percentage of respondents under the age of 30 who support the work of the head of state decreased from 61 to 56%, and among those who, according to self-assessment of their income, belong to the category of 20% of the most affluent residents of the region, the share of those who support the President's performance decreased from 71 to 66%.

According to the public opinion, the President is concerned much more with Russia's position on the world stage than with the financial situation of the people. For instance, on average during V. Putin's third presidential term, 42% of the Oblast residents considered that he was concerned first of all with international issues *(Insert 2, Figure 2)*. And in February 2019, the share of those who share this opinion increased to 54% (even despite the President's policy statements, which focused primarily on addressing domestic socio-economic and political issues in the period up to 2024). For comparison: only 7–8% of the residents of the region consistently share the point of view that V. Putin is primarily concerned with "people's financial situation".

People's opinion that the President addresses mostly the situation in the international arena is objective and has its reasons. In fact, throughout the period of gradual restoration of Russia's international status after the collapse of the Soviet Union and the period of the "turbulent 1990s" (that is, since 2000 and especially since 2007, when V. Putin delivered his famous Munich speech), the United States of America and its allies have been waging a full-fledged war aimed at preventing the emergence of a new strong player in the geopolitical arena. According to experts, "it is strategically important for the U.S. to stop the revival of Russia. After all, Russia is becoming not just an independent state, but a global geopolitical player; one of the world's geopolitical centers. It becomes the "supporting structure" of the new world order... That is why the Americans started messing around. They have one goal – to stop Russia"[10]. Economic sanctions, doping scandals around Russian sports, the Skripal case, tense situation in Syria and Ukraine, aggravation of the political situation in Venezuela – all these events and the "tools" of the hybrid war, of course, demand the President's attention at least because ensuring territorial security of the borders is a necessary condition in addressing sustainable development issues. Nevertheless, we cannot belittle the importance of the internal agenda: Russian history has repeatedly proved that if the ruling elites neglect the emerging needs of the masses for a long time, this poses a threat akin to external expansion and leads to the most disastrous consequences for the state.

Therefore, the effectiveness of implementation of the main tasks of public administration requires balance; and the historical task that the President has to deal with today in order to implement the most effective transit in 2024 and beyond consists in showing his political will and making the difficult,

> It is well-known that Putin is responsible for the growth of the military industrial complex and for the strengthening of the army, the exploration of reserves of mineral resources of Russia, including the continental shelf, their development, production and implementation. Medvedev is responsible for agriculture, forestry, fishery, waterways, rivers, ports, development of cities and towns, housing and communal services, etc.
>
> **Wherever there is personal control or personal interest of Vladimir Putin, everything is all right. Where comes the responsibility of the Government and some of its members, almost everywhere there is devastation, corruption and raw materials exporting economy.**[11]

[10] "It seems that NATO is preparing for a war with Russia" (an interview with L. Ivashov). *Moskovskii komsomolets,* 2016, June 27. Available at: https://www.vologda.kp.ru/daily/26547.7/3563115/

[11] President! Don't you sell us! *Argumenty nedeli,* 2018, no. 13 (606), April 5. Available at: http://argumenti.ru/society/2018/04/568556?typelink=openlink

but long overdue decisions about the responsibility of officials and the mechanisms of effective public control over the adoption of management decisions at all levels of power. According to experts, "we, Russians, often suffer from bifurcation, parallelism, and duplication. We have only one state post, the institute, that does not split – it is the President ... Neither efficiency, nor poor pensioners, not bad education in itself will change the Constitution, because it is necessary to change the policy of the government"[12].

At the end of V. Putin's third presidential term there was an increase in the share of positive judgments about his success in strengthening Russia's international positions (from 43 to 54%), in restoring order in the country (from 35 to 51%), in the protection of democracy and strengthening citizens' freedoms (from 29 to 41%; *Inserts 3–4, Figures 3–5*). **However, the share of the Oblast residents who believe that the head of state successfully copes with the problem of economic recovery and welfare growth still remains stable and extremely low**: in fact, since the global financial crisis (2009) the proportion of those who share this opinion varies in the range of 27–35%, and it amounted to 31% by the end of 2018, the share similar to that in the crisis year of 2009 (32%) and only slightly more than in 2000–2001 (26–28%; *Insert 4, Figure 6*) when the country was just beginning to recover from the severe economic shocks of the 1990s. In February 2019, the share of positive assesments of the success of the President's work on addressing the issues of economic recovery and growth of citizens' welfare decreased to 28%.

The attitude toward the authorities, as well as the general social feeling, depends primarily on how people assess the dynamics of their well-being. In this issue, significant changes (neither for the worse nor for the better) have not been observed since 2009. In fact, over the past ten years, the proportion of the Oblast's residents who consider themselves as people of "average income", is about 40–44%, and the proportion of the "poor and extremely poor" varies in the range of 45–50% *(Insert 5, Figure 7)*. According to the results of the third presidential term, the share of "poor and extremely poor" residents of the Oblast was 47%.

The "stagnant" nature of self-assessment of the dynamics of the financial situation – the most important factor in social well-being and civic activity – does not yet allow us to talk about any serious grounds for "breakthrough development", and in the first nine months of V. Putin's next presidential term there has been no tangible progress in this situation.

Management decisions taken in 2018 (VAT increase and the pension reform), apparently, hit Russians hard. The decisions affected not so much the perception of the current financial situation as the assessment of its prospects. Thus, in June 2018 – February 2019, the proportion of people of "average income", as well as the "poor and extremely poor" did not change (43 and 45%, respectively; *Insert 5, Figure 7*), but the consumer sentiment index[13], which reflects the dynamics of people's forecasts about the future of the Russian economy and their own financial situation, decreased from 92 to 90 p. over the same period *(Insert 5, Figure 8)*.

[12] Will there be a next anniversary of the Russian Constitution? (an interview with Professor S. Shakhrai). *Argumenty nedeli,* 2018, no. 49 (642), December 13. Available at: http://argumenti.ru/society/2018/12/595669?typelink=openlink

[13] The consumer sentiment index is calculated based on the answers to the questions:

1. How would you assess the financial situationof your family: is it better or worse than it was a year ago? (answers: "better", "worse").

2. If we talk about major purchases for the house, then, generally speaking, do you think now is a good or bad time to buy most of these goods? (answers: "good", "bad").

3. Do you think that in a year your financial situation will be better, worse or about the same as it is now? (answers: "it will be better", "it will be worse").

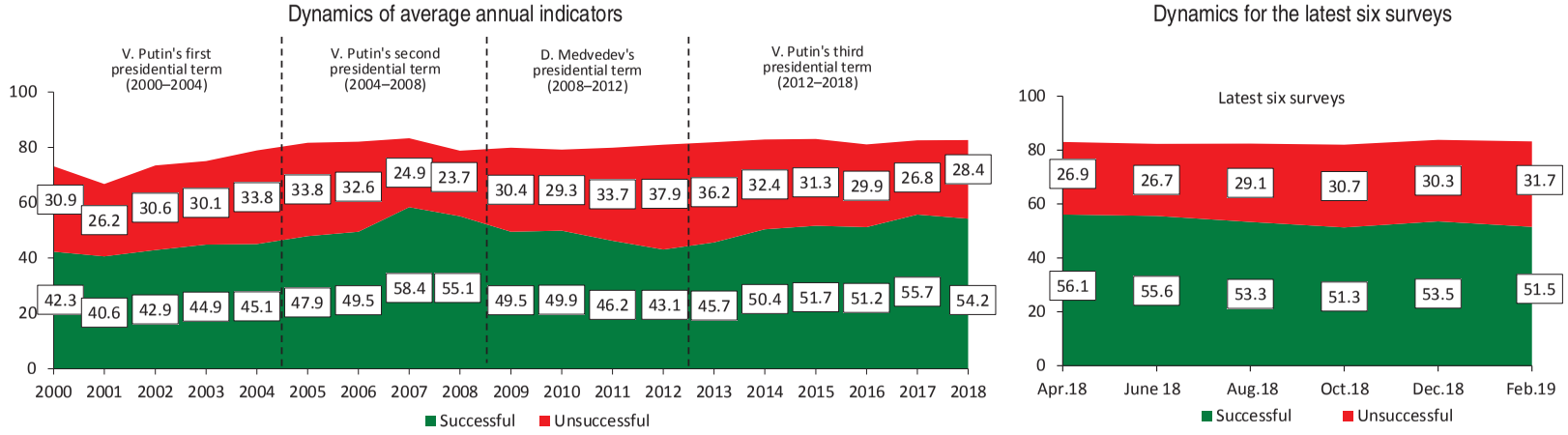
4. Do you think the next 12 months will be a good or a bad time for the country's economy, or will there be something else? (answers: "good", "bad").

5. If we talk about the next five years, will they be a good or bad time for the country's economy? (answers: "good", "bad").

Private indices are calculated for each question. The arithmetic mean of the partial indices gives the total value of the consumer sentiment index.

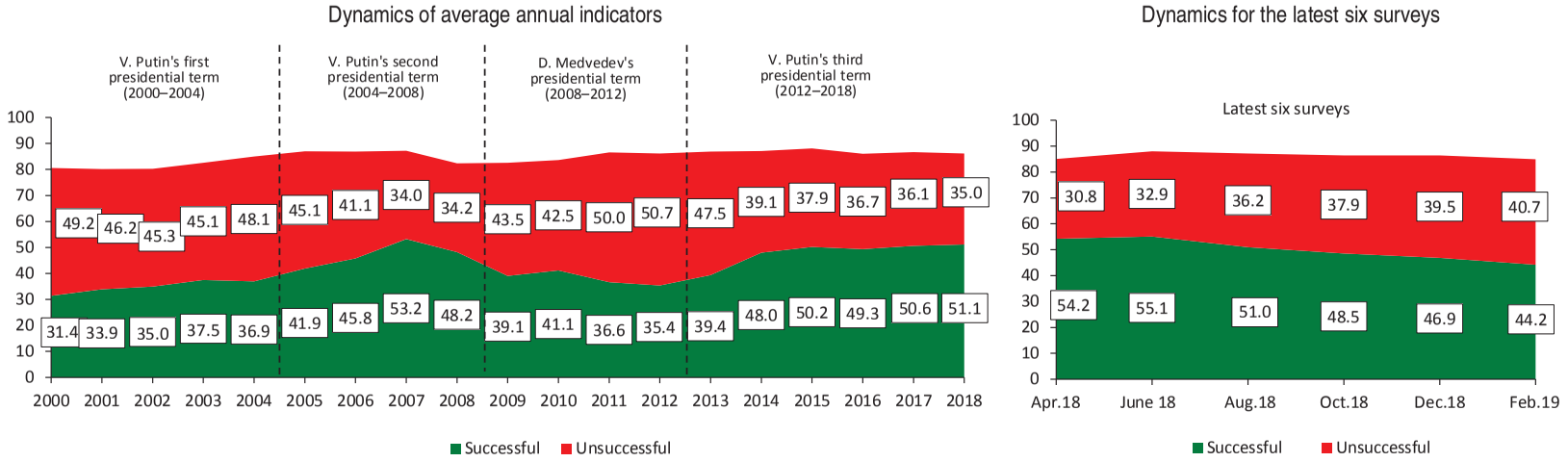
Insert 3

Figure 3. In your opinion, how successful is the Russian President in addressing the problem of strengthening Russia's international positions? (% of respondents)*



* Included in the survey since 2000.

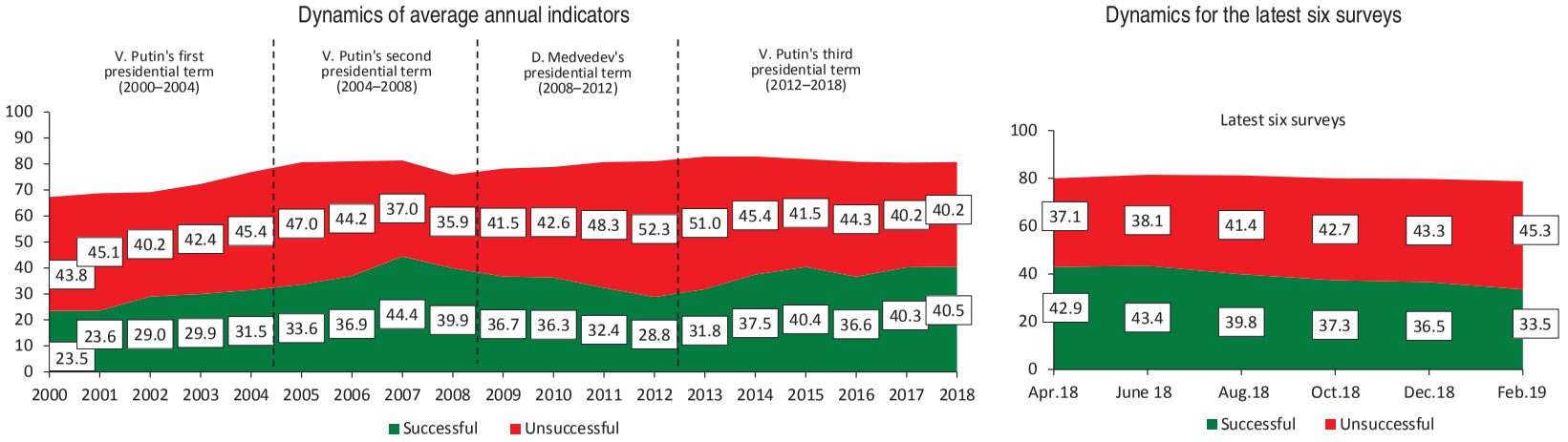
Figure 4. In your opinion, how successful is the Russian President in addressing the problem of restoring order in the country? (% of respondents)*



* Included in the survey since 2000.

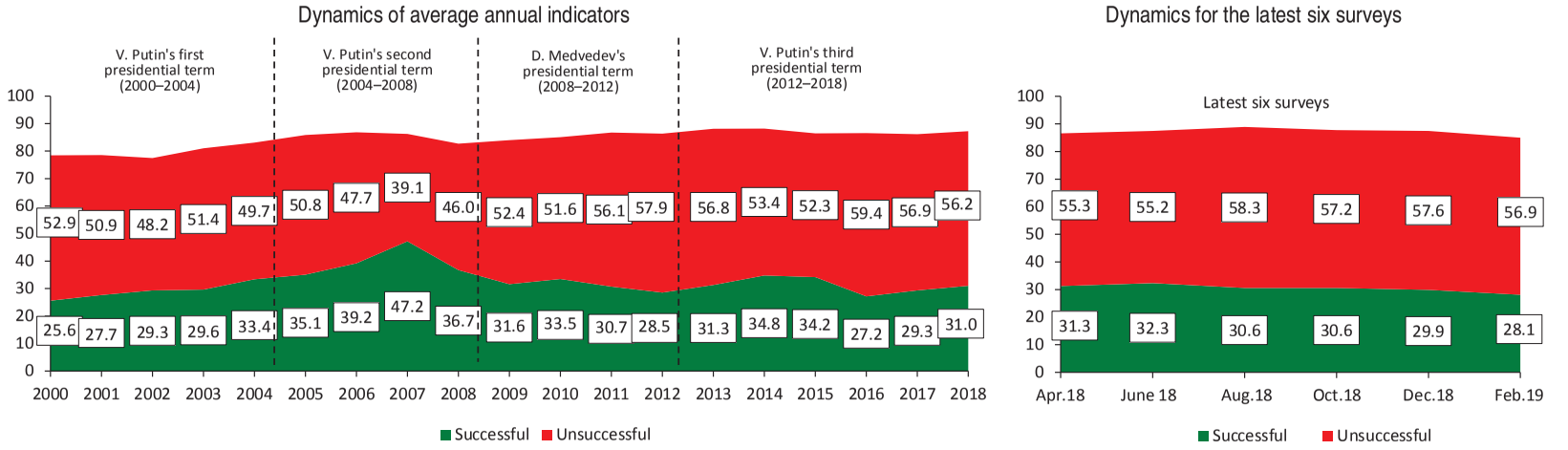
Insert 4

Figure 5. In your opinion, how successful is the Russian President in addressing the problem of protecting democracy and strengthening citizens' freedoms? (% of respondents)*



* Included in the survey since 2000.

Figure 6. In your opinion, how successful is the Russian President in addressing the problem of economic recovery and promoting citizens' welfare? ((% of respondents)*



* Included in the survey since 2000.

Insert 5

Figure 7. What group do you belong to, in your opinion? (% of respondents)

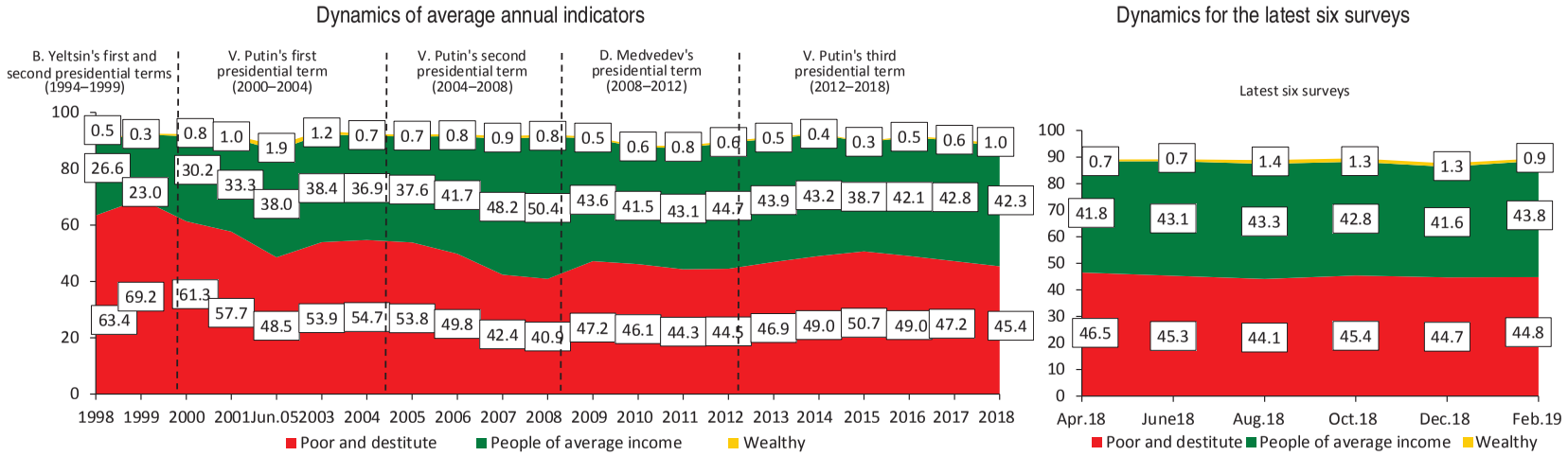
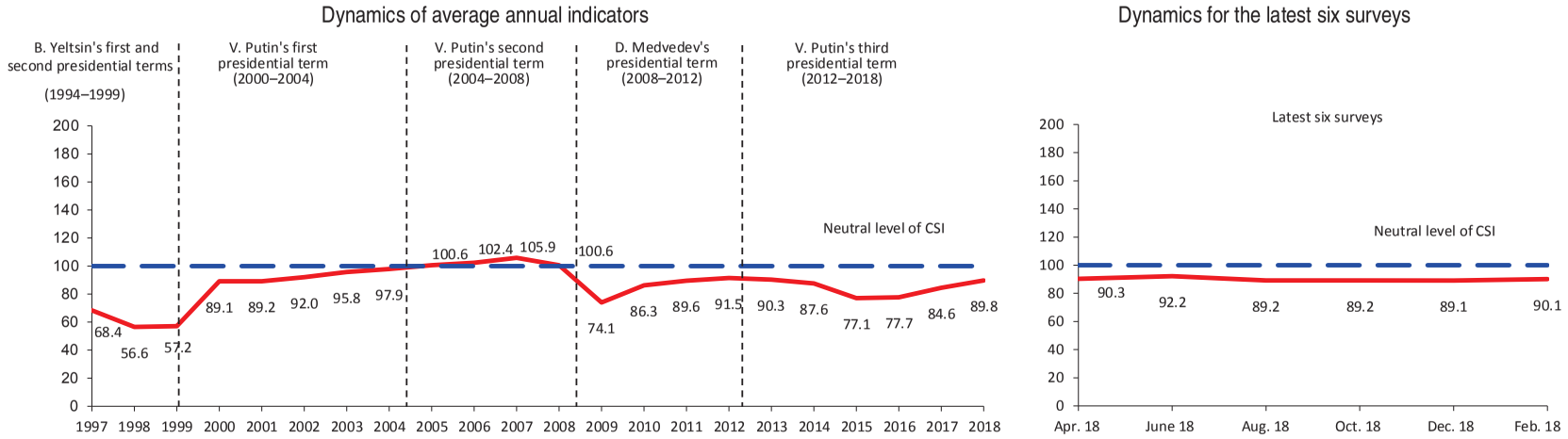


Figure 8. Consumer sentiment index (CSI, points*)



*To calculate the CSI, the proportion of negative answers is subtracted from the proportion of positive answers, then 100 is added to the resulting value, so as not to have negative values. Thus, completely negative answers would give the general index 0, positive – 200, the balance of the former and the latter expresses the value of the index 100, which is, in fact, a neutral mark (– – –).

The value of the CSI below 100 points means that more than 50% of respondents give negative forecasts about the future economic situation in the country and their personal material well-being.

Insert 6

Figure 9. What could you say about your mood in the last few days? (% of respondents)

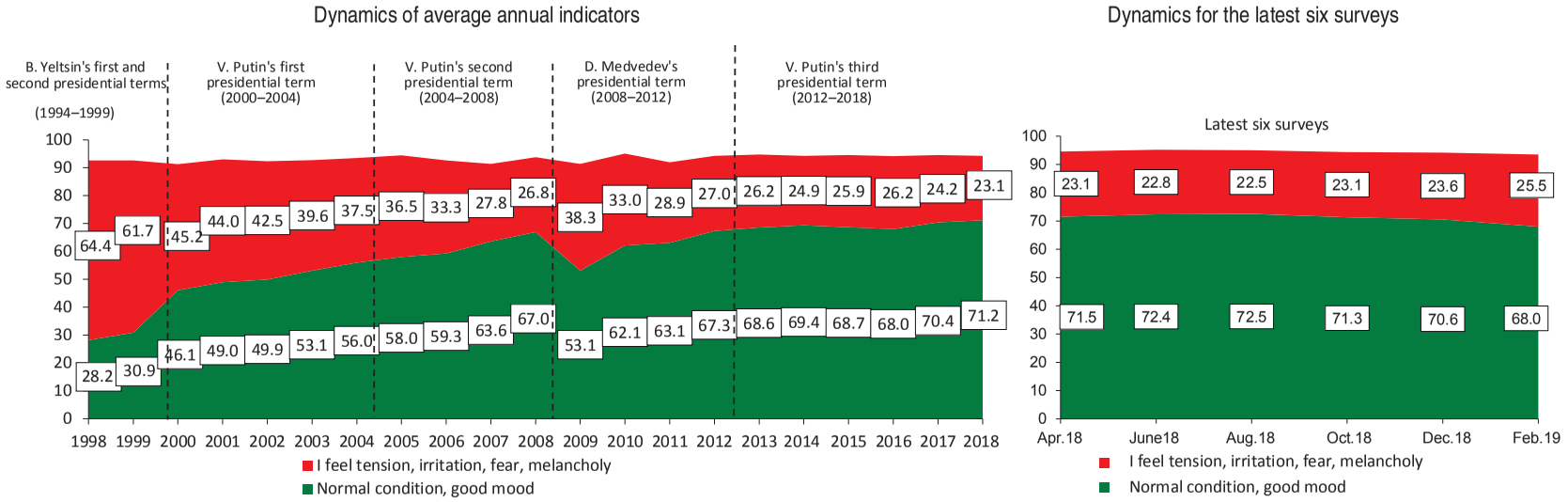
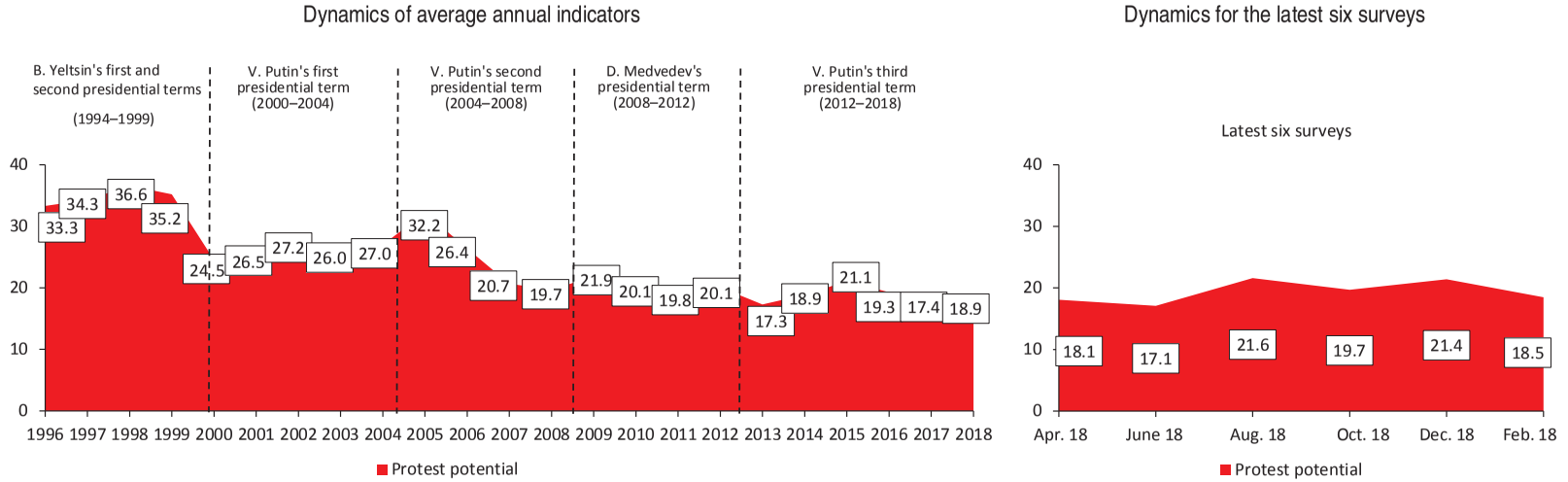


Figure 10. Protest potential



Despite the mainly negative assessment of the dynamics and perspective financial situation, people's mood in some aspects remains positive. A steady improvement in the emotional background is observed almost throughout the whole measurement period (from 2000 to 2018). During V. Putin's third presidential term, the proportion of people who characterize their mood as "normal, good" increased from 67 to 70% *(Insert 6, Figure 9)*.

Some caution, however, is caused by the dynamics of people's assessments in 2018: on the one hand, there were no negative changes in them (even despite the unambiguously negative attitude of the majority of the Oblast residents toward raising VAT and retirement age, the share of those who positively characterize their mood remained at 71%). On the other hand, ambiguous government decisions did not make people more optimistic. Thus, from February to December 2018, the share of those who "feel tension, irritation, fear, melancholy" remained stable at 23%. At the beginning of 2019, we already observe noticeable negative changes: in particular, the proportion of people who positively characterize their mood decreased from 71 to 68% in the last two months.

The dynamics of the protest potential over the latest six surveys show multidirectional trends. In general, for the period from April 2018 to February 2019, it remained at the level of 18%, while the "surge" was observed in June – August (from 17 to 22%; *Insert 6, Figure 10*), which also indicates a clearly negative first reaction of people to the changes in pension legislation. In December 2018, the level of protest potential was 21%, which was the same as in 2009 and 2015 – the crisis years for the Russian economy.

The year 2018 provided a vivid example of how the general level of discontent with the situation in the country is quickly converted by the non-systemic opposition into real protest actions, and the danger here lies not only in the purposeful undermining of public confidence in the government, but also in the next factor hindering the implementation of plans for Russia's breakthrough development.

II. Assessment of the dynamics of the results of the past year

Every year in February, VolRC RAS conducts a sociological survey, in which the Vologda Oblast residents assess the results of the past year and describe their expectations about the prospects of the coming year. The following section shows the main results of the next "wave" of the survey. The dynamics of the relevant data for the entire survey period (from 2000 to February 2019) are provided for comparison.

In general, during this period, the dynamics of public opinion showed a rather sharp deterioration in the estimates of the outgoing year only twice (both for the country as a whole and for one's family). This was during the period of 2008–2009 (coinciding with the global financial crisis and the end of V. Putin's second presidential term) and during the period of 2013–2015, when there were talks about a new wave of economic crisis comparable with the economic shocks of the 1990s in Russia *(Insert 7, Figures 11–12)*. Even the euphoria of the "Crimean spring", which took place in early 2014, "began to give way to people's discontent with price tags in stores" by June 2014[14].

It is noteworthy that in these crisis periods, the assessment of the results of the year for Russia as a whole deteriorated more rapidly than for one's family. Thus, in 2008–2009, the share of positive judgments about the results of the year for the country decreased by 24 p.p. (from 43 to 19%), for one's family – by 18 p.p. (from 48 to 30%). In 2013–2015 for Russia – by 26 p.p. (from 45 to 19%), for one's family – by 11 p.p. (from 50 to 39%). **These changes suggest that it is in their personal and family life that people find more opportunities to improve their living conditions and maintain well-being.** It is no coincidence that more

[14] In the minds of Russians, Crimea retreats under the onslaught of the crisis. Vedomosti, 2015, January 30. Available at: http://www.vedomosti.ru/opinion/news/38844121/krizisprotiv-kryma

than half of the Oblast residents (from 54 to 82%) note that they are pleased with the state of affairs at work, in relations with friends and relatives, and in health *(Insert 9, Table 2)*. However, when it comes to the political or economic situation in the country, the share of positive judgments does not exceed 40% *(Insert 10, Table 3)*.

The concentration of people's interests and hopes on their microsocium correlates with the assessments of experts who in the 2010s noted such a phenomenon as social atomization of Russian society[15], and today they register a steady growth of the so-called "self-sufficient Russians" who do not need state support or simply do not believe in its effectiveness"[16]. According to FSRC RAS estimates, the share of "self-sufficient Russians" increased from 34 to 48% in 2011–2016. Experts note: "Today, self-sufficient Russians are not a social periphery, not a marginal layer, but a significant social group that expresses a trend toward the formation of an activist dominant in Russian society"[17].

Thus, having learned to do without the support of the authorities, society increasingly ceases to count on this support and tries to find resources for adaptation in its immediate environment. This trend is noted both nationwide and in the findings of the surveys conducted in the Vologda Oblast.

A special place in the list of problems faced by respondents in the past year belongs to "uncertainty abouy the future". Throughout the measurement period (from 1998 to February 2019), this problem ranked first, with the exception of 2007, when most of the monitoring indicators achieved the highest scores *(Insert 11, Table 6)*. Since 2012, 50–60% of the residents of the Vologda Oblast have noted they feel uncertainty about the future.

Uncertainty about the future is a problem that is in fact typical of the whole of modern world civilization, which scholars call a "society of dangers and disasters"[18], a society "in which security is raised to a level of central value"[19]; "a risk society that is constantly balancing on the edge of security and unreliability, uncertainty and choice"[20]. This is connected not only with the unstable geopolitical situation, but also with rapid scientific and technological progress, and in particular with the development of information technology that increases the variability of choice of opinions and, accordingly, the inconsistency of public consciousness.

Nevertheless, it should be said that the key problems that 25 to 35% of the population have to deal with ("inability to improve housing conditions due to the high cost of housing", "lack of funds for paid medical care", "necessity to find additional employment due to the low income", "reducing the time for rest due to the need to work extra hours") are certainly the factors that destabilize people's ideas about tomorrow and force them to seek support in the circle of closest friends and relatives.

Analyzing the list of critical life issues as a criterion of efficiency of activity of the ruling elites, we should note that in general the relevance of some of them decreased for the period from 2000 to February 2019 (this, in particular, concerns such problems as high crime rate, delays in payment of salaries and pensions, inability to improve

[15] Social atomism is a political and philosophical concept, according to which society consists of isolated individuals (a kind of "atoms") that enter into social interaction for the implementation of their own interests and goals (source: Analytical portal "Humanitarian technologies". Available at: https://gtmarket.ru/concepts/7227).

Gorshkov M.K., Tikhonova N.E. "Russian dream": an experience of sociological measurement. *Sotsiologicheskie issledovaniya*, 2012, no. 12, pp. 3-11; Zhukov V.I. Russia in the global system of social coordinates: sociological analysis and forecast. *Sotsiologicheskie issledovaniya=Sociological Studies,* 2008, no. 10, pp. 29-40.

[16] Petukhov V.V. Dynamics of social moods of Russians and the formation of request for changes. *Sotsis*, 2018, no. 11, p. 50.

[17] *Russian Society in Spring 2016: Concerns and Hopes: Information and Analytical Summary on the Results of the All-Russian Research.* Moscow, 2016. P. 30.

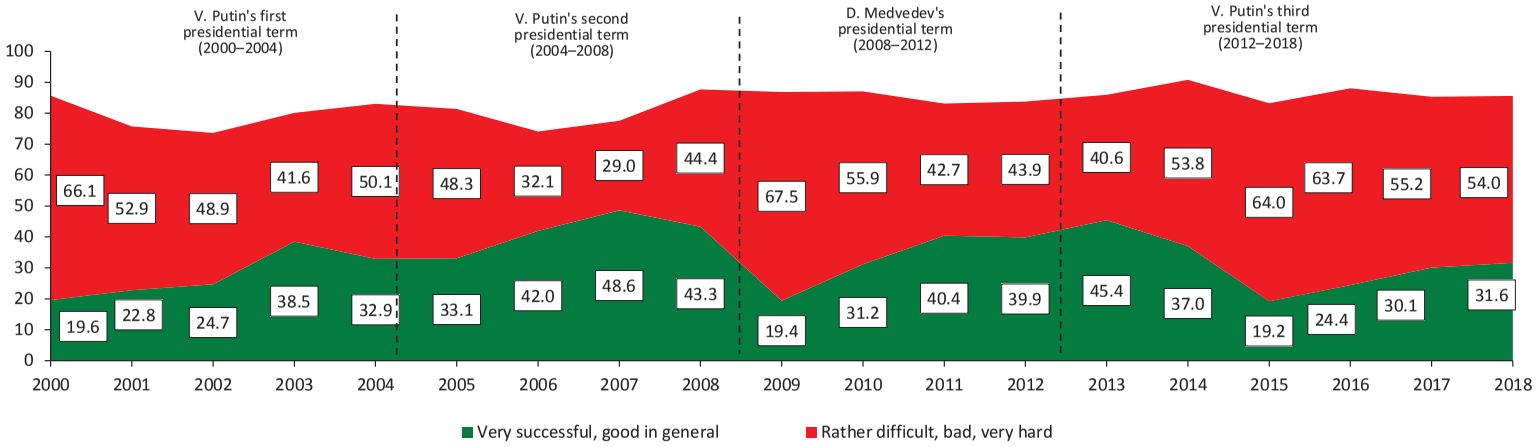
[18] Beck U. Risikogesellshaft. Auf dem Weg in eineande re Moderne. – Frankfurt am Main: Suhrkamp Verlag, 1986, 391 p.

[19] Ewald F. Die Versicherungs – Gesellshaft. Kritische Justiz, 1989, no. 22, pp. 385-393.

[20] Bechmann G. Modern society as a risk society. *Voprosy filosofii*, 2007, no. 1, pp. 26-46.

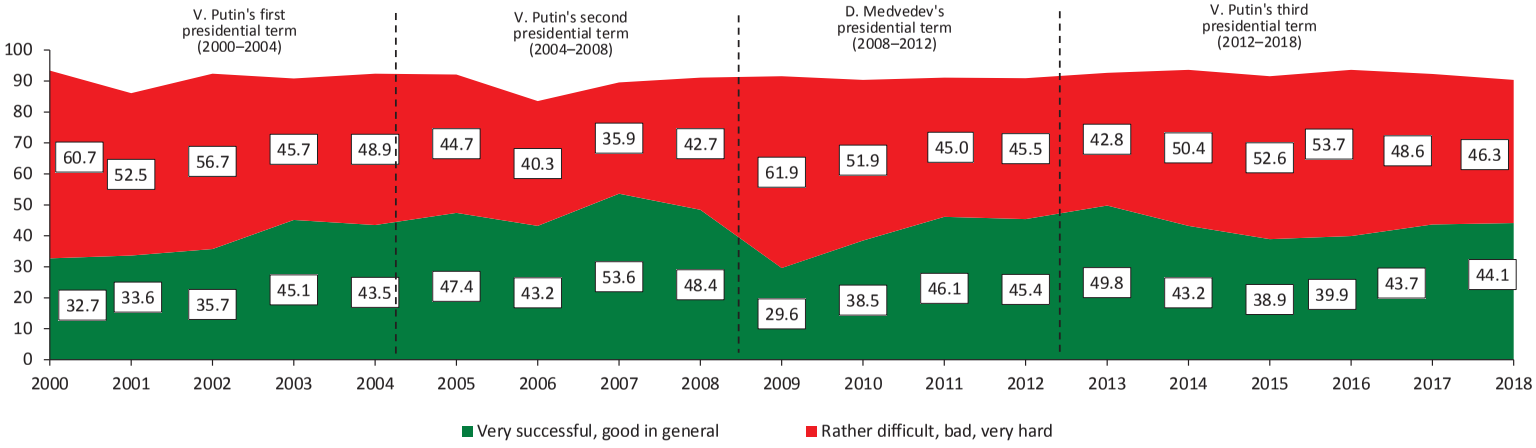
Insert 7

Figure 11. How would you assess the results of the past year for Russia?* (% of respondents)*



Included in the survey since 2001.

Figure 12. How would you assess the results of the past year for you personally (for your family) (% of respondents)*

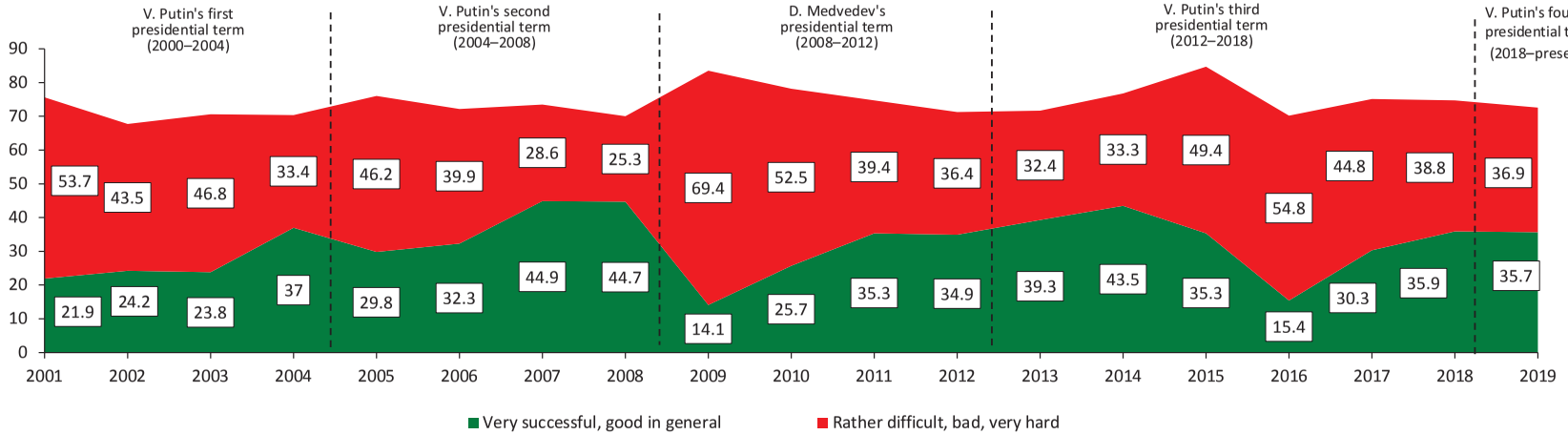


* The wording of the question is as follows: “How would you assess the results of the past year?”. Thus, the data for 2016 in the graphs were obtained in February 2017, the data for 2017 were obtained in February 2018, etc.

Included in the survey since 2001.

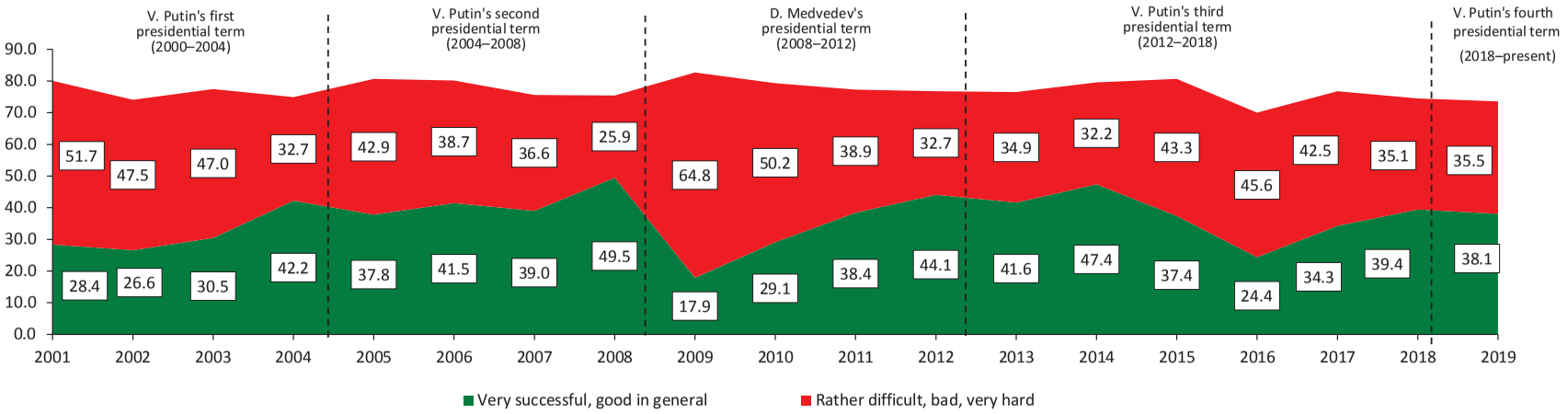
Insert 8

Figure 13. In your opinion, what will be the coming year for Russia? (% of respondents)*



* Included in the survey since 2001.

Figure 14. In your opinion, what will be the coming year for you personally (for your family)? (% of respondents)*



Included in the survey since 2001.

Insert 9

Table 2. Which of the following areas have you been most content with recently? (% of respondents)*

Answer	For reference: average annual estimate for 1998–1999 (B. Yeltsin's presidential term)	V. Putin's first presidential term (annual average estimate for 2000–2003)	V. Putin's second presidential term (annual average estimate for 2004–2007)	D. Medvedev' presidential term (annual average estimate for 2008–2011)	V. Putin's third presidential term (annual average estimate for 2012–2017)	Annual average estimate for 2018	Dynamics of annual average estimates (+/-),					
							2012–2017 to …				2018 to 2012–2017	
							1998-1999		2000-2003			
							+	-	+	-	+	-
1. Relations with friends, employees	58.0	62.6	67.0	71.5	78.2	82.1	+20		+16		+4	
2. Family relationships	54.8	58.6	64.0	69.3	76.0	79.9	+21		+17		+4	
3. Romantic relationships, sex life	37.8	41.4	49.4	50.7	58.8	59.3	+21		+17		+1	
4. My own state of health	30.8	35.7	45.5	45.3	56.5	58.6	+26		+21		+2	
5. Success in work and study	32.8	43.1	51.8	52.3	59.0	57.5	+26		+16			-2
6. State of health of my loved ones	24.0	30.0	39.9	43.0	52.3	54.1	+28		+22		+2	
7. Situation in the international arena	9.8	30.3	45.8	44.9	34.1	39.0	+24		+4		+5	
8. Political situation in the region	10.0	26.0	37.8	37.1	38.4	36.8	+28		+12			-2
9. Political situation in Russia	2.9	20.2	33.4	36.5	35.8	36.1	+33		+16		0	
10. Financial situation in my family	11.9	23.3	31.2	29.1	36.6	35.4	+25		+13			-1
11. Economic situation in Russia	3.1	14.5	29.1	20.9	26.4	23.5	+23		+12			-3
12. Economic situation in the region	7.3	20.8	33.4	21.9	23.7	21.3	+16		+3			-2
* Arranged according to the data as of 2018.												

Insert 10

Table 3. Which of the following areas have you been most displeased with recently? (% of respondents)*

Answer	For reference: average annual estimate for 1998–1999 (B. Yeltsin's presidential term)	V. Putin's first presidential term (annual average estimate for 2000–2003)	V. Putin's second presidential term (annual average estimate for 2004–2007)	D. Medvedev' presidential term (annual average estimate for 2008–2011)	V. Putin's third presidential term (annual average estimate for 2012–2017)	Annual average estimate for 2018	Dynamics of annual average estimates (+/-),					
							2012–2017 to …				2018 to 2012–2017	
							1998–1999		2000–2003			
							+	-	+	-	+	-
1. Economic situation in the region	67.5	52.8	50.0	62.8	70.2	74.0	+3		+17		+4	
2. Economic situation in Russia	79.6	62.1	55.6	64.5	67.7	72.8		-12	+6		+5	
3. Financial situation in my family	73.0	61.2	58.2	60.7	57.9	62.7		-15		-3	+5	
4. Political situation in Russia	74.6	53.9	49.8	47.0	56.8	61.0		-18	+3		+4	
5. Situation in the international arena	61.8	42.3	37.2	38.4	58.4	59.3		-3	+16		+1	
6. Political situation in the region	60.0	44.3	44.2	45.3	53.6	58.7		-6	+9		+5	
7. State of health of my loved ones	51.1	52.1	45.8	45.9	42.3	40.6		-9		-10		-2
8. My own state of health	51.4	48.0	43.5	44.5	38.0	37.6		-13		-10	0	
9. Success in work and study	36.1	30.3	31.9	30.6	31.8	36.8		-4	+2		+5	
10. Romantic relationships, sex life	28.4	30.1	31.7	31.8	32.2	35.4	+4		+2		+3	
11. Family relationships	23.7	22.4	23.6	20.2	18.7	18.6		-5		-4	0	
12. Relations with friends, employees	18.6	15.9	18.7	15.3	15.3	15.9		-3		-1	+1	

* Arranged according to the data as of 2018.

Insert 11

Table 6. Which of the following problems did you personally face last year?* (% of respondents)

Answer	For reference: average annual estimate for 1998–1999 (B. Yeltsin's presidential term)	V. Putin's first presidential term (annual average estimate for 2000–2003)	V. Putin's second presidential term (annual average estimate for 2004–2007)	D. Medvedev' presidential term (annual average estimate for 2008–2011)	V. Putin's third presidential term (annual average estimate for 2012–2017)	Annual average estimate for 2018	Dynamics of annual average estimates (+/-),					
							2012-2017 to…				2018-2019 to 2012-2017	
							1998-1999		2000-2003			
							+	-	+	-	+	-
1. Lack of confidence in the future	69.7	53.5	40.2	53.5	54.5	51.7		-15	+1			-3
2. Inability to improve housing conditions due to the high cost of housing	39.5	38.7	35.9	33.0	33.3	33.2		-6		-5	0	
3. Lack of money to pay for medical aid	27.8	27.0	23.0	23.2	26.0	28.8		-2		-1	+3	
4. Need to find additional work due to low income	32.0	26.3	22.7	24.0	28.7	24.8		-3	+2			-4
5.Reduced rest time due to the need to work extra	14.5	20.8	17.7	22.0	24.9	24.2	+10		+4			-1
6. High crime rate	36.4	32.1	33.7	23.6	18.6	23.8		-18		-14	+5	
7. The inability to purchase a travel package because of its high cost	14.7	18.5	18.4	17.9	23.6	20.8	+9		+5			-3
8. Lack of money to buy medicines	33.4	23.9	17.3	15.4	16.7	18.6		-17		-7	+2	
9. Delays in payment of wages (pensions, scholarships)	57.5	21.8	15.4	17.0	14.4	13.7		-43		-7		-1
10. Job loss	13.7	8.2	7.0	8.1	9.0	10.0		-5	+1		+1	

* The question was not asked in 2009.
** We provide 10 possible answers most common in 2018–2019. The full list consists of 13 possible answers.

Insert 12

Table 7. What plans did you manage to implement, among the things you had planned for the past year? (% of respondents)*

Answer	V. Putin's first presidential term (annual average estimate for 2000–2003)	V. Putin's second presidential term (annual average estimate for 2004–2007)	D. Medvedev' presidential term (annual average estimate for 2008–2011)	V. Putin's third presidential term (annual average estimate for 2012–2017)	Annual average estimate for 2018–2019	Dynamics of annual average estimates (+/-)			
						2012-2017 to 2000-2003		2018-2019 to 2012-2017	
						+	-	+	-
1. Buy new clothes, shoes	34.7	40.1	42.9	43.5	46.5	+9		+3	
2. Improve the quality of nutrition	24.2	27.7	24.8	19.5	21.7		-5	+2	
3. Get a job	18.4	18.6	15.6	15.0	16.8		-3	+2	
4. Provide children with quality education	13.9	12.6	12.4	12.0	12.5		-2	+1	
5. Receive necessary medical care	13.3	12.9	14.1	12.6	11.3		-1		-1
6. Improve living conditions	11.1	12.9	10.3	11.1	11.6	0		+1	
7. Raise the salary	18.7	18.2	13.1	11.4	11.3		-7	0	
8. Buy a car	6.4	9.8	9.5	9.2	7.5	+3			-2
9. Spend holidays in a health resort (recreation center) in Russia	6.4	7.6	7.4	6.8	5.9	0			-1
10. Spend holidays abroad	2.8	4.6	5.8	6.1	4.9	+3			-1
11. Buy a country house, a private subsidiary plot	9.6	9.1	7.1	4.3	3.6		-5		-1
It's difficult to answer	11.4	14.5	7.2	9.4	7.4		-2		-2
* Included in the survey since 2000.									

Table 8. What plans did you fail to implement, among the things you had planned for the past year? (% of respondents)*

Answer	V. Putin's first presidential term (annual average estimate for 2000–2003)	V. Putin's second presidential term (annual average estimate for 2004–2007)	D. Medvedev' presidential term (annual average estimate for 2008–2011)	V. Putin's third presidential term (annual average estimate for 2012–2017)	Annual average estimate for 2018–2019	Dynamics of annual average estimates (+/-)			
						2012-2017 to 2000-2003		2018-2019 to 2012-2017	
						+	-	+	-
1. Buy new clothes, shoes	35.7	24.7	24.2	21.6	17.5		-14		-4
2. Improve the quality of nutrition	38.5	29.1	29.1	29.2	25.2		-9		-4
3. Get a job	18.4	17.2	18.1	19.1	17.6	+1			-2
4. Provide children with quality education	18.6	17.0	14.3	12.5	14.0		-6	+2	
5. Receive necessary medical care	33.8	29.2	31.3	29.3	31.5		-5	+2	
6. Improve living conditions	37.8	34.3	33.3	31.8	34.2		-6	+2	
7. Raise the salary	42.0	39.2	45.7	47.6	45.8	+6			-2
8. Buy a car	23.6	24.0	23.5	24.3	23.5	+1			-1
9. Spend holidays in a health resort (recreation center) in Russia	28.1	24.8	25.8	27.8	28.1	0		0	
10. Spend holidays abroad	14.5	16.1	18.3	22.6	24.2	+8		+2	
11. Buy a country house, a private subsidiary plot	10.4	11.3	13.1	13.9	14.4	+4		+1	
It's difficult to answer	11.4	14.5	7.2	9.4	7.4		-2		-2
* Included in the survey since 2000.									

Table 4. Which of the following problems did you personally face last year?* (% of respondents)

Answer**	V. Putin's first presidential term (annual average estimate for 2000–2003)	V. Putin's third presidential term (annual average estimate for 2012–2017)	Annual average estimate for 2018–2019	Dynamics of annual average estimates (+/-),			
				2012–2017 to 2000–2003		2018–2019 to 2012–2017	
				+	-	+	-
Lack of confidence in the future	53.5	54.5	51.7	+1			-3
Inability to improve housing conditions due to the high cost of housing	38.7	33.3	33.2		-5	0	
Lack of money to pay for medical aid	27.0	26.0	28.8		-1	+3	
Need to find additional work due to low income	26.3	28.7	24.8	+2			-4
Reduced rest time due to the need to work extra	20.8	24.9	24.2	+4			-1
High crime rate	32.1	18.6	23.8		-14	+5	
The inability to purchase a travel package because of its high cost	18.5	23.6	20.8	+5			-3
Lack of money to buy medicines	23.9	16.7	18.6		-7	+2	
Delays in payment of wages (pensions, scholarships)	21.8	14.4	13.7		-7		-1
Job loss	8.2	9.0	10.0	+1		+1	

* The question was not asked in 2009.
** We provide 10 possible answers most common in 2018–2019. The full list consists of 13 possible answers.

housing conditions; *Table 4*). At the same time, the relevance of a number of important problems has remained and even increased during V. Putin's three presidential terms. Thus, according to the results of his third presidential term in comparison with his first presidential term, we point out the following problems:

✓ the share of people who feel uncertain about the future remains the same (54%);

✓ the proportion of those who do not have enough money for paid medical service remains stable (27%);

✓ 26–29% of the Oblast residents still face the need to find additional employment because of low earnings;

✓ 8–9% note that last year they faced the problem of job loss.

In addition, during these periods, the proportion of those who do not have enough time to rest due to the need to work extra hours increased (from 21 to 25%), as well as the proportion of those who cannot buy a travel package because of its high cost (from 19 to 24%).

Thus, if we compare the current situation with that in the beginning of the 2000s (2000–2002), we see that the relevance of most of the issues under consideration decreased for the population of the region as a whole. However, this cannot be said if we compare people's estimates in 2018 and at the beginning of V. Putin's second (2004) and third (2012) presidential terms. In other words, no positive dynamics have been observed over the past 10–15 years.

A slightly different picture is noted in relation to the implementation of life plans *(Insert 12, Table 7)*. In the period from 2000–2003 to 2012–2017, people began to say more often that in the past year they were able to buy new clothes and shoes (from 35 to 44%), but there were no significant changes in all other positions listed in the survey. Moreover, during V. Putin's three presidential terms there was a decrease in the share of those who were able to improve the quality of their nutrition (from 24 to 20%), raise their wages (from 19 to 11%), and buy a country house or a private subsidiary plot (from 10 to 4%).

Table 5. Implementation of the plans for the year in the period of the third and the beginning of the fourth presidential terms of V. Putin (% of respondents)*

Answer	V. Putin's third presidential term (annual average estimate for 2012–2017)			Annual average estimate for 2018–2019		
	Was implemented	Wasn't implemented	Dynamics	Was implemented	Wasn't implemented	Dynamics
Buy new clothes, shoes	43.5	21.6	22	46.5	17.5	29
Improve the quality of nutrition	19.5	29.2	-10	21.7	25.2	-4
Get a job	15.0	19.1	-4	16.8	17.6	-1
Provide children with quality education	12.0	12.5	-1	12.5	14.0	-2
Receive necessary medical care	12.6	29.3	-17	11.3	31.5	-20
Improve living conditions	11.1	31.8	-21	11.6	34.2	-23
Raise the salary	11.4	47.6	-36	11.3	45.8	-35
Buy a car	9.2	24.3	-15	7.5	23.5	-16
Spend holidays in a health resort (recreation center) in Russia	6.8	27.8	-21	5.9	28.1	-22
Spend holidays abroad	6.1	22.6	-17	4.9	24.2	-19
Buy a country house, a private subsidiary plot	4.3	13.9	-10	3.6	14.4	-11

* Excluding those who did not plan the options specified in the question or found it difficult to answer.

We can assume that people are less likely to implement their plans for the year, and it happens not because the opportunities for this are reduced, but because these plans have already been implemented earlier and, accordingly, people just do not intend to implement them next year. However, this could be said, for example, about buying a car, a private subsidiary plot or about getting a job. **The lack of positive changes to improve the quality of nutrition, education, medical care and housing not only for oneself but also for one's children can hardly be explained by the fact that people are fully satisfied with these spheres of life. Even more so if we consider that the proportion of those who note the severity of such problems as "inaccessibility of health care, poor quality of medical services", "low availability of housing", "poor quality of engineering infrastructure (housing, roads, transport)" is 30–35% (according to the data as of 2018), and the proportion of those who point out "non-availability of educational services, poor quality of education" is 10–12%, and this figure has not changed since 2008.**

We should mention the fact that at the end of V. Putin's third presidential term, as well as in 2018 – February 2019, the proportion of the Oblast residents who have not implemented their plans for the year, in most positions significantly exceeds the proportion of those who were able to do it. This includes plans to improve the quality of nutrition, receive necessary medical care, improve housing conditions, and raise wages *(Table 5, Tables 7–8 of Insert 12)*.

Thus, summing up the results of the brief analysis of the dynamics of public opinion for the period from 2000 to 2019 that covers V. Putin's three presidential terms and the beginning of his fourth presidency and one presidential term of D. Medvedev, it is necessary first of all to emphasize the obvious decline in the rate of positive trends observed mainly after the global financial crisis. **In fact, after the "collapse" of most indicators in 2008–2009 the pre-crisis level has not been reached either in the assessments of the head of state's performance, or in the assessment of personal financial situation, or in people's ideas about the**

future. Only the dynamics of their daily emotional state can be assessed relatively positively, which (as our research shows) is connected neither with the improvement of the situation in the country, nor with finding an effective solution to socio-economic issues, but rather with the fact that the interests of the Oblast residents ame being focused more on the sphere of personal, family, and micro-social relations.

The fact that stable assessments are preserved generally reflects the strategic line of V. Putin's policy, since he prefers to act carefully and step-by-step, resorting to cardinal decisions only at "peak" moments (as, for example, in the situation with the accession of Crimea to Russia). However, after nine months of V. Putin's fourth presidential term, there are more and more factors indicating that maintaining stability alone is not enough.

> The West is driving the case toward the total war, at any cost, without any rules; because as history shows, it cannot win a regular war against Russia... The very fact that the coming six-year term will be the last for V. Putin adds the ultimate drama to the whole situation, because this term will unfold in a cascade of increasing external challenges and, ultimately, total war... [21]

First, there still remains the pressure on Russia on the part of the U.S., UK and their allies. At the same time, the situation in the international arena indicates that in the coming years Russia cannot count on friendly partnership with the West. Consequently, the only way to maintain its status in the rapidly developing geopolitical space is to increase the power and effectiveness of the implementation of human potential within the country, which means to create comfortable conditions for life, to increase public confidence in the government, to ensure smooth operation of the means of social mobility and conditions for implementation of civil initiatives. The need to develop at a faster pace was noted by the President himself, who pointed out that "the main threat and our main enemy is the fact that we are falling behind. If we are unable to reverse this trend, we will fall even further behind"[22]. However, this cannot be achieved if the general population is voluntarily distancing itself from social and state issues.

Second, since 2014, Russia has been experiencing a growing trend in the number of people who believe that currently reforming key areas of life in the country is more important than maintaining stability. **"Today a significant part of Russian society comes to the conclusion that in the new realities the focus on stability actually means the focus on the preservation of stagnation and crisis phenomena. It is not a denial of stability as a public good, especially in a country that has experienced many cataclysms in its recent history, but rather an understanding of the fact that the inertial-protective paradigm of social development implemented by the authorities at this historical moment has exhausted itself"**[23].

> The number of those who believe that the country needs significant changes and political and economic reforms has doubled over the past six years (from 28% in 2012 to 56% in 2018). Thus, Russian society is gradually approaching another turn, a bifurcation in the road that opens up a new socio-economic and political perspective. There is a growing awareness that, without a serious reassessment of the strategies and priorities that proved successful in the past relatively successful decade, the country is unlikely to be able to move forward effectively[24].

[21] Korovin V. Golgotha of the last time. *Zavtra*, 2018, May 21. Available at: http://zavtra.ru/blogs/golgofa_poslednego_sroka

[22] Address of the President to the Federal Assembly, March 1, 2018. *Official Website of the President of the Russian Federation*. Available at: http://www.kremlin.ru/events/president/news/56957

[23] Petukhov V.V. Dynamics of social moods of Russians and the formation of request for changes. *Sotsis*, 2018, no. 11, p. 43.

[24] Russian Society after the Presidential Election-2018: Request for a Change: Information and Analytical Summary. Moscow, 2018. P. 7.

Thus, in Russia as a whole, from 2014 to 2018, the share of those who believe that "the country needs stability" decreased from 70 to 44%, and the share of those who believe that "the country needs significant changes" increased from 30 to 56%.

The survey conducted in the Vologda Oblast has shown a similar trend: from February to August 2018, the proportion of residents of the region who believe that Russia needs stability decreased from 44 to 37%, and the proportion of those who believe that the country needs change increased from 38 to 46%[25]. Thus, it is obvious that the implementation of this need (the need for change) will be the main factor in people's trust in the authorities and in V. Putin personally.

There has been some reshuffling in the composition of the Russian government, but it was not reduced essentially to getting rid of useless players and hiring new ones (although, it was done, too); rather it was all about trading places inside the cabinet of ministers. All this picturesque game of swapping places and offices in the White House looks like an illustration to Krylov's famous fable "Quartet" with its moral: "And you, my friends, no matter your positions, will never be musicians!" And yet... [26]

According to the monitoring conducted by VolRC RAS in 2015, 51% of residents of the Vologda Oblast believed that"modern Russian society is arranged unfairly". In 2016, their proportion was 57%, in 2018 – 60%.

However, so far there have been no tangible positive changes in the way people assess the situation in the country. The Government, which remained practically unchanged, "forgot about the previous May 2012 Decrees of the President"[27], and in its efforts to replenish the budget and search for funds for the implementation of the new May 2018 Decree came up with nothing better than the following measures:

A. To increase the retirement age, that is, to put it mildly, once again turn a blind eye to the unacceptable (even M. Oreshkin, the Minister of Economic Development of the Russian Federation, admitted it)[28] level of social inequality and, accordingly, ignore public demand for social justice.

B. To increase VAT from 18 to 20%, although, according to the Public Opinion Foundation (FOM), 34% of Russians believe that the increase in VAT will do the economy more harm than good (the opposite point of view is shared by 19% of the population); 57% of citizens believe that this reform will adversely affect their personal well-being (a different opinion is expressed by only 4% of respondents)[29]. According to experts, "value added tax is one of the most convenient for the authorities, as it is one of the easily administered (i.e. collected) taxes. Its increase, of course, is painful for business. And, of course, business will try to shift the maximum burden of increasing the tax on consumers, that is, citizens, incorporating the increase in the prices of goods and services.

[25] Methodical note: the survey conducted by VolRC RAS in the Vologda Oblast contained the answer "It's difficult to answer". In February and August 2018, 17–18% of the population chose it. This explains some discrepancy in the estimates of residents of the Vologda Oblast and Russia as a whole. **Nevertheless, the general trend of growth in the need for change is similar in both studies.**

[26] Nagornyi A. Putin: the fourth term in office. *Zavtra Newspaper*, 2018, May 18. Available at: http://zavtra.ru/blogs/putin_srok_chetvyortij

[27] It will cost five thousand rubles to obtain an international passport: why so expensive. *Moskovskii komsomolets,* 2018, June 19 (an opinion of Finam analyst A. Korenev). Available at: http://www.mk.ru/social/2018/06/19/oformlenie-zagranpasporta-oboydetsya-v-5-tysyach-rubley-pochemu-tak-dorogo.html

[28] Oreshkin called the level of inequality in Russia unacceptable. *Moskovskii komsomolets*, 2019, January 15. Available at: https://www.mk.ru/economics/2019/01/15/oreshkin-nazval-nedopustimym-uroven-neravenstva-v-rossii.html

[29] *About VAT Increase: FOM Press Release*, 2018, July 2. Available at: http://fom.ru/Ekonomika/14058

And, of course, this cannot but raise inflation and lower the standard of living, and not just once and not for a short time"[30].

B. To carry out the so-called "tax maneuver" in the oil industry; this maneuver is officially presented as a tool for replenishing the budget; but, according to some analysts, it is done only so that "companies would not lose their position in the world market", although "fuel will rise in price, and this is an absolutely inevitable process"[31].

> Keep in mind that we are all talking about progressive taxation. We say that the poor should pay little and the rich should pay much. There will be no progressive taxation, it is very difficult to implement, and there will be more taxes, and taxes will regulate everything. Property taxes, taxes on expensive cars, tax on gasoline, because the price of gasoline is the main tax[32].

We can only guess what population group will have to "tighten the belt" next time; but it is obvious that the self-employed, for example, are much more likely to do this than the billionaires, the number of which in our country only in the last two years increased by 29 people (from 2016 to 2018 – from 77 to 106), and "the total fortune of all 200 richest Russian entrepreneurs for the year increased by 5.4%, or 25 billion USD, up to 485 billion USD"[33].

In May 2018, at the Saint Petersburg International Economic Forum, State Duma Deputy A. Makarov said with irony that "the main task of implementing the Presidential Decree has been solved. We handed Rosstat over to the Ministry of Economic Development"[34]. However, when almost a year has passed, we can see firsthand that these words are not far from the truth. Thus, according to Rosstat, GDP in 2018 grew by 2.3% compared to 2017. "The Russian economy has not shown such growth rates since 2012. At the same time, almost no one expected economic growth to reach more

> According to most experts, the level of inequality in the country is only growing. Even Rosstat admitted that inequality in 2018 began to increase at an accelerated pace. However, official statistics registered the minimum level of inequality for 12 years in 2017; this fact raises certain questions.
>
> The growth in the number of dollar billionaires reflects the dynamics most clearly. **According to data published in April last year, there has been a record increase in the number of dollar billionaires over the past two years. Moreover, the state of 200 rich people exceeded the reserves of the Central Bank and the bank savings of all Russians.**
>
> The Gini coefficient is the most common indicator of property stratification in the world. It compares the annual incomes of poor and rich citizens and shows the level of deviation from the absolute norm, that is, the same growth in the incomes of social groups. The closer to zero, the more equality in society and vice versa. **In January–September 2018, the index increased from 0.400 to 0.402 compared to the same period in 2017.** But in reality, statistics data do not give a complete picture, especially since often the incomes and assets of the richest population groups are not in the open access... According to the World Inequality Report prepared by researchers from the World Inequality Lab and published in 2017, **the level of economic inequality in modern Russia is comparable with pre-revolutionary indicators**[35].

[30] Byalyi Yu. Pension farce – 2018. K*rasnaya Vesna News Agency*, 2018, June 29. Available at: https://rossaprimavera.ru/article/365b3ffa?gazeta=/gazeta/284

[31] What threatens Russia if the duties on oil are zeroed? Available at: http://www.nykhas.ru/460863/chem-grozit-rossii-obnulenie-poshliny-n/ 26.02.2018 (an opinion of V. Bessel, Vice-President of NewTech Services group of companies, Professor of Gubkin Russian State University of Oil and Gas).

[32] *Ibidem*.

[33] In Russia for two years, the number of dollar billionaires increased by 29 people. *RBK News*, 2018, April 19. Available at: https://www.rbc.ru/business/19/04/2018/5ad82b929a79475a053b96f5

[34] A. Makarov's speech at SPIEF 2018. *Komsomolskaya pravda,* 2018, May 27. Available at: https://www.vologda.kp.ru/daily/26834.7/3874829/

[35] Oreshkin said inequality in Russia was beyond the limits. What is dangerous about this problem? *Vesti. Ekonomika,* 2019, January 15. Availble at: https://www.vestifinance.ru/articles/113095?utm_referrer=https%3A%2F%2Fzen.yandex.com

than 2% last year: a consensus forecast of the Higher School of Economics provided for the growth of 1.7%, the Ministry of Economic Development said it woukd be 1.8%"[36].

However, as experts note, "a significant GDP growth was achieved only at the expense of revision of the data on construction. **And it is not a large-scale growth throughout the economy**"[37]. In fact, "investment growth is weak, domestic consumer demand is slowing down"[38]. Consumer spending of Russian households at the end of last year amounted to only 2.2%, although, this figure reached 2.5% in the first three quarters of 2018[39].

Thus, "we can believe in the figures of Rosstat – in construction, and in the data on GDP growth. But then we have to admit that the system of collecting statistics is completely ruined"[40].

...The trust in this instrument for measuring the state of the economy [Rosstat] was not simply in jeopardy. It just collapsed... The return of trust requires public control over the work of Rosstat. It is not enough to return it under the jurisdiction of the Cabinet of Ministers, as it has been done repeatedly. An obvious proposal is to equalize the status of Rosstat, for example, with the Accounts Chamber, which formally does not belong to any of the branches of government[41].

"It is possible that the new parameters of the assessment may result from a new government strategy to summarize the work of the federal center... We should not forget that the authorities plan to change radically the criteria for assessing poverty in the country, so we should not rule out that in the near future federal agencies will report that poverty in Russia is defeated, there are no poor citizens in the country anymore, and the middle class calls the shots"[42].

According to the long-term dynamics of research, the indicators of public opinion monitoring are quite sensitive to the key events taking place in the country (such as the "Crimean spring", the deterioration of the economic situation in 2008 and 2014). In this regard, we can say that the preservation of stable assessments concerning the work of the government, financial situation and mood in 2018 is an advantage rather than a disadvantage on the background of reforms in the pension legislation and the tax system, which were initially opposed by 80 and 57% of Russians, respectively[43].

The current pace of economic development does not suit us, and there is no reason to expect a faster growth of gross domestic product (GDP) and incomes. The goals are there, all the necessary resources are there, but we see no results. Why? **Because we still do not have a clearly formulated and comprehensive economic policy. Instead, we have a set of disparate solutions that do not make the overall clear picture[44].**

[36] What explains the unexpected acceleration of the Russian economy. *RBK*. Available at: https://www.rbc.ru/economics/04/02/2019/5c586c9f9a79472433e1d9a2?utm_referrer=https%3A%2F%2Fzen.yandex.com

[37] The opinion of S. Murashov, macroanalyst at Raiffeisenbank (source: RBC. Available at: https://www.rbc.ru/economics/04/02/2019/5c586c9f9a79472433e1d9a2?utm_referrer=https%3A%2F%2Fzen.yandex.com).

[38] Opinion of D. Dolgin, chief economist of ING for Russia and CIS (source: ibidem).

[39] Tagorov V. We are becoming wealthier on paper: according to Rosstat, the Russian economy is growing at a record pace. Available at: https://wek.ru/bogateem-na-bumage-rosstat-narisoval-rossijskoj-yekonomike-rekordnyj-rost

[40] An opinion of K. Tremasov, director of the analytical department "Loko-Invest" and former head of the department of macroeconomic forecasting of the Ministry of Economic Development (source: RBC. Available at: https://www.rbc.ru/economics/04/02/2019/5c586c9f9a79472433e1d9a2?utm_referrer=https%3A%2F%2Fzen.yandex.com)

[41] How do we reorganize Rosstat? (editorial). *Nezavisimaya gazeta,* 2019, February 7. Available at: http://www.ng.ru/editorial/2019-02-07/2_7502_red.html

[42] Tagorov V. We are becoming wealthier on paper: according to Rosstat, the Russian economy is growing at a record pace. Available at: https://wek.ru/bogateem-na-bumage-rosstat-narisoval-rossijskoj-yekonomike-rekordnyj-rost

[43] See: 1. *About VAT Increase: FOM Press Release,* 2018, July 2. Available at: http://fom.ru/Ekonomika/14058

2. *Raising the retirement age: citizens' reaction: FOM press release,* 2018, June 29. Available at: http://fom.ru/Ekonomika/14057

[44] Ivanter V.V. (Ed.). *Structural and Investment Policy Aimed to Ensure Economic Growth in Russia.* Moscow: Nauchnyi konsul'tant, 2017. 196 p.

Nevertheless, in the context of ambitious plans for the period up to 2024 and, at the same time, in the absence of "time to spare", current trends in public opinion are difficult to assess positively. **Especially if we take into account the fact that the milestone period should be considered not 2024, but 2021, in which the election to the State Duma of the Russian Federation will be held.** According to experts, "the parliamentary election of 2021 is very important for the organization of a normal shift in 2024". If society does not support the United Russia party and there is a situation of "uncertain format of the next Parliament", then "it means there will be very serious political problems"[45].

The further policy of preserving the current state of affairs in the country is becoming an increasingly tangible threat to social stability and national security in general. Therefore, decisions that can ensure a breakthrough development in the dynamics of the standard of living and quality of life should be taken in the near future.

In the forecast of economic development, the least interesting are standard figures – the price of oil, the exchange rate, the rate of inflation, i.e. all that newspapers are so fond of writing about. **A list of specific actions to achieve the goals set by the President would be much more important...** A forecast is not an action plan, but an assessment of the possible consequences of the policy that prevails in the economy. **What is needed is not a forecast, but a state plan. A concrete and real plan**[46].

The following two things are needed to over-come the stagnation and ensure breakthrough development in the dynamics of the stasndard of living and quality of life:

first, the "system of strategic management" based on the "system of long -, medium- and short-term forecasts and the choice of economic development priorities, tools and on the mechanisms for their implementation"[47]. We need a concrete and efficient action plan, not just a list of ambitious goals and optimistic indicators;

second, we need a "new Primakov" – a person who is able not only to declare, but also to organize a breakthrough in development; who is able to unite representatives of different political forces and elite groups, and on the basis of not just a common idea, but a concrete and achievable plan of action; who is able to hold officials at all levels accountable for the failure to implement this plan. According to experts, "in fact, all the necessary tools have already been determined by the authorities – there exists a law on strategic planning. **The only trouble is that it is not being observed. This is exactly the case when you do not need to invent anything again; it is enough to take the law and act in accordance with it"**[48]. Thus, the **mechanism of responsibility** of public authorities and authorized officials for the objective results of their work **should be streamlined in order to work smoothly.**

Under the circumstances when the Russian Government "cannot formulate strategic goals and monitor their achievement"[49], **the key role in the implementation of these two tasks should be played directly by the President,** whose powers are, in fact, the main tool that can shift the vector of development of public administration toward the nationally oriented goals noted by the head of state in the Address to the Federal Assembly and the May 2018 Decree.

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

[46] Ivanter V.V. Mechanisms of economic growth. *Mir novoi ekonomiki*, 2018, no. 3, p. 27.

[47] Glaz'ev S.Yu. *A Leap Forward into the Future: Russia in New Technological and World Economic Structures*. Moscow: Knizhnyi mir, 2018. P. 481.

[48] Ivanter V.V. Mechanisms of economic growth. *Mir novoi ekonomiki*, 2018, no. 3, p. 27.

[49] Glaz'ev S.Yu. *A Leap Forward into the Future: Russia in New Technological and World Economic Structures*. Moscow: Knizhnyi mir, 2018. P. 482.

It is necessary to change the institutional environment in the framework of decision-making and to build a clear hierarchy of authorities in the framework of the development strategy and its implementation.

Within the framework of this configuration, **to define strategic development objectives is the function of the head of state,** who, using the potential of the government and the expert community, should offer a coordinated and implemented set of targets for the development of the country in the medium and long term[50].

We are talking about the system of selection of managerial personnel at all levels of the power vertical, starting with the Government of the Russian Federation. In Russia, it is necessary to change political consciousness, value priorities and moral responsibility of the ruling elites. All this cannot happen on its own, without the active participation of the head of state (who over the past decades has repeatedly proved to Russian society that he focused on the implementation of the interests of the general population, including those concerning domestic policy). We need a clear system of criteria to determine the effectiveness of the authorities, based on objective and comprehensive indicators... **Without a change in the political consciousness and political responsibility of the ruling elites before society, the very "breakthrough" that the President spoke about in his Address is impossibleto achieve, and without the "breakthrough" it is impossible to ensure the country's competitiveness at the geopolitical level, which in the current conditions of development of the world civilization actually means the loss of sovereignty and the crisis of Russian statehood.**

Will the President be willing and able to show his political will to make difficult, but long overdue decisions? This will determine the fate of the main historical task he has to deal with during his last presidential term: the task of ensuring the country's progressive entry into the new political cycle of 2024.

* * *

In his Address to the Federal Assembly of the Russian Federation on February 20, 2019, the President noted: "You cannot fool the people. They are acutely aware of hypocrisy, lack of respect or any injustice. They have little interest in red tape and bureaucratic routine. It is important for people to see what is really being done and the impact it has on their lives and the lives of their families. And not sometime in the future, but now"[51]. That is why Vladimir Putin pointed out the following:

first, "very soon, this year people should feel real changes for the better";

second – that the first results of the work on national projects planned for the beginning of 2020 will be summed up "on the basis of the opinion and assessments of citizens"[52].

It is a powerful statement, because it was made against the background of "the lowest indicators of trust in the head of state for the whole time of trust surveys conducted by VTsIOM"[53] (33.4% according to VTsIOM as of January 13, 2019)[54].

[50] Shirov A.A., Gusev M.S., Kolpakov A.Yu. et al. *Transformation of the Structure of the Economy: Mechanisms and Management.* Moscow, 2018. P. 257.

[51] Presidential Address to the Federal Assembly of the Russian Federation, February 20, 2019. Available at: http://www.kremlin.ru/events/president/news/59863

[52] *Ibidem.*

[53] Uglanov A. What is on the minds of the people of the deep. *Argumenty nedeli*, 2019, no. 6 (650), February 14–22. Available at: http://argumenti.ru/society/2019/02/602299?typelink=openlink

[54] *Trust ratings of politicians; ratings of approval of the work of state institutions; ratings of the parties: VTsIOM press release,* 2019, no. 3859, January 18. Available at: https://wciom.ru/index.php?id=236&uid=9518

In addition, the head of state expressed his support for the financial block of the Government, saying the following: "I would like to address those of our colleagues who constantly criticise the Government, its financial and economic ministries and ask where the money went and where we invested it. We set a target to reach a certain level, after which we can use these funds, although cautiously so as not to cause any macroeconomic disturbances. We are about to reach this level, and are beginning to do it"[55].

Thus, Vladimir Putin takes **personal responsibility** for the implementation of national projects and for the achievement of targets for breakthrough development in raising living standards and improving the quality of life and promoting the dynamic development of the economy, as defined in the May 2018 Decree.

Key benchmarks and concrete directions for improving the quality of life are likely to be supported by the dynamics of public sentiment. **But will their final implementation meet people's expectations?** ... Taking into account negative results of the Government's work on the implementation of the May 2012 Decrees, this issue is not only critical but also sensitive.

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Cross-Border Investment Cooperation in the Arctic Region: Challenges and Opportunities

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Abstract. The article considers the investment processes that take place in the foreign and Russian Arctic, the tools to attract investment and the possibility of accumulating best practices in the implementation of investment projects. Analysis of the data on planned, unfinished and cancelled projects in the Russian and foreign Arctic, including joint projects, allows us to reveal problems in cross-border investment cooperation. In the framework of global economic challenges, when discussing the opportunities for the Northern regions alternative to large-scale production and transportation, we determine the need to find new promising areas of investment, including infrastructure projects. On the basis of official, statistical and expert assessments, we analyze the priorities and directions of investment activities in the Arctic and the main tools to increase investment attractiveness and promote investment. We consider European Neighbourhood and Partnership Instrument (ENPI) Kolarctic 2007–2013 as an analytical case, since it is one of the most effective tools for providing financial support to multilateral cross-border cooperation projects in the Barents Euro-Arctic Region. The project field of the program is quite extensive and contains a variety of topics; thsi contributed to the promotion of cross-border cooperation in various fields, involvement of different target groups and stakeholders, and development of project cooperation between different sectors in the Barents Euro-Arctic Region. We find it necessary to consider foreign practice of the comprehensive use of both direct and indirect methods for attracting investments; on its basis it can be possible to create the banks of best investment practices in Russia's Northern regions. Having revealed the inertia of investment processes in the Arctic, we conclude that it is necessary to develop a strategy to increase the investment attractiveness of the Northern territories.

Key words: Arctic Region, cross-border investment cooperation, large-scale infrastructure projects, Kolarctic cooperation program, best investment practices, investment attractiveness strategy.

Introduction

A wide range of strategic issues for the development of the Arctic region is within the scope of state competence and is addressed at the regional, national and international levels. Thus, special federal ministries (the Ministry of the Russian Federation for the Development of the Far East and the Ministry of the Russian Federation for the North Caucasus) have been created so as to promote the implementation of strategic development in the Far Eastern and North Caucasian macro-regions. As for the Arctic Zone of the Russian Federation (AZRF), its issues are within the competence of an advisory body under the Government of the Russian Federation – the State Commission on Arctic Development [1]. In addition, to date, the Government has decided not to create a separate body of state administration for the AZRF, but instead to determine the powers for the development of this region for the Ministry for the Development of the Far East. It should be noted that the final composition of the territories of the Russian Arctic as the Northern macroregion continues has not been determined yet. Thus, according to the Decree of the President of Russia "On land territories of the Arctic Zone of the Russian Federation" No. 296 dated May 2, 2014, the Russian Arctic is defined within the boundaries of the Murmansk Oblast, Nenets, Chukchi, Yamalo-Nenets autonomous okrugs, as well as a number of municipalities of the Republic of Sakha (Yakutia), Krasnoyarsk Krai, Arkhangelsk Oblast, and the lands and islands located in the Arctic Ocean[1]. And in 2017, a new decree

[1] On land territories of the Arctic Zone of the Russian Federation: Decree of the President of the Russian Federation No. 296 dated May 2, 2014. Available at: http://www.kremlin.ru/acts/bank/38377

of the President of the Russian Federation expanded the list of territories of the Russian Arctic by including Belomorsky, Loukhsky and Kemsky municipal districts of the Republic of Karelia[2]. Since the Arctic Zone of the Russian Federation consists of 25 urban municipalities, 32 municipal districts and two specific municipal entities (an island – Novaya Zemlya and a rural-type settlement – Amderma) that are characterized by heterogeneity of socio-economic development, the achievement of key priorities is possible only through broader regional and cross-border cooperation focused on the exchange of innovations and the development of human capital in the circumpolar North. Arctic projects that can bring tremendous social and economic effects to the population of the Arctic territories, in particular, to create up to one million jobs, require a significant amount of investment resources (estimated at about 25 billion USD a year) not only in exploration, but also in the development of infrastructure[3]. In 2017, Ernst & Young experts recorded a kind of investment boom – foreign investors have participated in 238 projects in Russia[4]. Competition for investment in the real economy has intensified both in the global economy and between regions within Russia. Without investment, it is impossible to make an innovative breakthrough, especially in those regions that are of great geopolitical importance for Russia, but are not attractive due to various reasons and circumstances. The problem of investment attractiveness for the regions of the European North of Russia is the key one in achieving effective socio-economic development. In principle, financial sources of investment are limitless for any country and for any region in the world market economy. The only problem is how to attract investment in this particular country or region. In the list of investment areas it is worth noting the importance of large-scale infrastructure projects for sustainable economic development of Russian regions. It is necessary to concentrate not only on the current, fast-acting tools for regulating the investment climate, which is currently important, but also on those areas that will affect the deep processes and factors (efficiency, balance, diversification of resources and potentials) and will be able to determine a significant improvement in the investment situation of the European North of Russia in the long term. Cross-border cooperation programs, the role of which is still underestimated, contribute to accelerating the development of the infrastructure of territories. The goals of our study are as follows: to substantiate the fundamental importance of cross-border investment cooperation in the development of the Arctic territories, to summarize best practices of this interaction under European programs, and to develop recommendations for a strategy to increase the investment attractiveness of the Northern territories. To achieve these goals, it is necessary to reveal the problems and identify the promising areas for cross-border investment cooperation in the Arctic region, as well as to analyze direct and indirect tools for attracting investment used in foreign practice.

Review of conceptual approaches and the research methodology

The object of the study is the investment processes taking place in the foreign and Russian Arctic, the tools to attract investment,

[2] On amending the Decree of the President of the Russian Federation of May 2, 2014 No. 296 "On land territories of the Arctic Zone of the Russian Federation": Decree of the President of the Russian Federation of June 27, 2017 No. 287. Available at: http://www.kremlin.ru/acts/bank/42021

[3] *Arctic Business Forum Yearbook 2018.* Lapland Chamber of Commerce, 2018. Available at: http://arcticbusinessforum.com/wp/wp-content/uploads/2018/04/ABF_2018_yearbook_web.pdf

[4] *EY's Attractiveness Survey Europe: Russia, 2018.* Ernst & Young. Available at: https://www.ey.com/Publication/vwLUAssets/ey-european-attractiveness-survey-2018/$File/ey-european-attractiveness-survey-2018.pdf

and the possibility of accumulation and dissemination of best practices. All investment projects can be grouped into national, international and cross-border according to the criterion of location of the territories and countries participating in them. Cross-border issues are considered in the works of S.P. Bystritskii, A.G. Granberg, V.K. Zausaev, N.M. Mezhevich, P.A. Minakir, P.A. Mitskevich, M.Yu. Shinkovskii, etc. Currently, both near-border and cross-border cooperation is a field of interdisciplinary research. The concepts based on the theories of new regionalism, social constructivism, and neoliberal institutionalism mainly refer to the political and sociological approaches generalized in the thesis of A.P. Sologub [2]. Political research also extends to the Arctic regions [3, 4], while the discussions on investment cooperation involve officials of the Arctic countries [5] and representatives of international Arctic organizations [6]. Studies on the need for cross-border reform of legal mechanisms are also the sphere of formation of new scientific concepts in jurisprudence [7, 8]. Geographical theories are based on spatial and resource concepts [9, 10], a significant contribution in this direction is made by Professor A. Pilyasov [11], an authority on the Northern regions and the Arctic. There are no clearly defined economic concepts of cross-border cooperation; researchers consider certain aspects of this process: methodological tools for assessing investment attractiveness [12], mechanisms to ensure the movement of investment flows [13], and the effectiveness of the use of entrepreneurial resources within the framework of cross-border cooperation [14]. Although the majority of economic concepts agree that the business partnership of neighboring countries is one of the effective mechanisms for accelerated and sustainable development of border areas [15, 16], some researchers focus on national security issues. For example, D.A. Medvedev, an expert at the Center for Strategic Assessments and Forecasts, focuses on the prospects and directions of international economic cooperation in the Arctic megaregion, taking into account national interests [17]. We think that cross-border cooperation has a number of distinct economic advantages over national and international cooperation:

1. A more stable and predictable environment for mutual trade than in multilateral trade negotiations, where the interests of the participants are very different.

2. Exemption from strict administrative regulations from the federal center; transfer of key decisions to regional centers (constituent entities of the Russian Federation) and local authorities.

3. Immediate geographical proximity of the border region, the presence of a common border and communications, historically established economic ties simplify the trade process by reducing transaction costs.

4. Common regional interests in terms of sustainability (environmental requirements and standards, etc.).

5. Establishment of public-municipal-private partnerships for infrastructure investment.

6. Support and encouragement of local producers (especially small enterprises that do not have a strong export potential), for which a wider regional market is emerging.

7. Establishment of direct market relations between entrepreneurs with the prospect of establishing joint ventures.

Due to the fact that many important economic problems of countries intersect directly at the border, cross-border cooperation can act as a kind of pilot site, contributing to the solution of certain issues of inter-state

Table 1. EU financing of infrastructure projects initiated by the Russian partner within the framework of ENPI CBC for 2007–2013

Leading partner	Program	Sphere	Number of projects	EU financing, euros
Kaliningrad Oblast	LT-PL-RU	Healthcare	2	4476821
		Housing and utilities	2	3304500
		Tourism	1	1227634
Leningrad Oblast	SEFR	Road infrastructure	2	6840000
Republic of Karelia	KAR	Road infrastructure	2	3480000
Compiled with the use of [18].				

relations, including those on which it is difficult or impossible to make a decision at a higher level.

Taking all this into consideration, we used methods of content analysis of strategic documents of the Arctic countries, reports of state institutions and development institutions on investment activities and cooperation, as well as methods of analysis of databases on Arctic projects and statistical methods.

Analysis of foreign experience allows us to draw conclusions about the comprehensive use of both direct and indirect tools to attract investment5. Due to the weak investment attractiveness of the Arctic projects, due to high investments and significant risks, the major part of financing is carried out at the expense of budget expenditures. Direct state financing of investments in the Arctic territories is implemented in two aspects: either to develop the infrastructure, or to support local communities and equalize the level of income[6]. The challenges associated with the development, maintenance and operation of infrastructure lead the governments of the Arctic powers to the conclusion that it is necessary to create new mechanisms of public-private and multinational partnerships.

The European Neighborhood and Partnership Instrument (ENPI CBC), which includes six programs with Russian partici-pation, was subjected to a more detailed study from these positions. Fifty-four leading Russian partners and 490 Russian project partners participated in the first period of ENPI CBC implementation [18].

The Kaliningrad and Leningrad oblasts, as well as the Republic of Karelia took the most active part in the initiation of large-scale infrastructure projects *(Table 1)*.

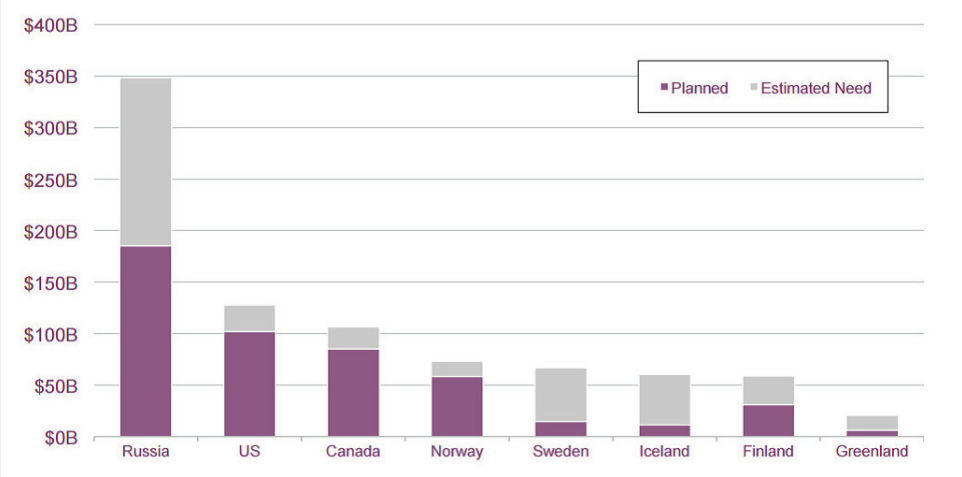
The list of the regions attractive to investors contains very few infrastructure projects implemented in the territory of the Arctic Zone of the Russian Federation[7]. At the same time, according to the US investment firm Guggenheim Partners, over the next decade, the Arctic will require about one trillion of investment in infrastructure, including transport, telecommunications and social services, to support a new era of economic opportunities ranging from energy, fisheries and mining to defense and tourism [19, 20]. The database includes 900 planned, incomplete, completed, cancelled and prospective Arctic infrastructure projects. Russia is far ahead of its neighbors, with nearly 250 potential projects *(Fig. 1)*.

[5] The World Economic Outlook (WEO): Seeking Sustainable Growth: Short-Term Recovery, Long-Term Challenges, International Monetary Fund. 2017, Washington, DC, October. Available at: https://www.imf.org/en/Publications/WEO/Issues/2017/09/19/world-economic-outlook-october-2017

[6] See, for example: EU Arctic policy. Available at: https://eeas.europa.eu/arctic-policy/eu-arctic-policy_en; Financing of Barents Cooperation. Report of the BEAC Ad Hoc Working Group on Financial Mechanism Study (2015). Ministry for Foreign Affairs of Finland. – Helsinki; Norway's Arctic Strategy – between geopolitics and social development, 21 April 2017. Available at: https://www.regjeringen.no/contentassets/fad46f0404e14b2a9b551ca7359c1000/arctic-strategy.pdf

[7] World Investment Report 2018. Available at: http://unctad.org/en/PublicationsLibrary/wir2018_en.pdf

Figure 1. Estimated investment requirements, billion USD



Source: Guggenheim Partners Endorses World Economic Forum's Arctic Investment Protocol.

According to the European Commission report (2017), the EU priorities in the formation of future funding programs will focus on the following key investment projects in the Arctic [21]:

• sustainable fishery and marine resources, including aquaculture (Greenland), other marine industries(Faroe Islands), and reindeer husbandry and hunting (Saami Council);

• mining, mineral and other resource-based industries, as well as the chemical industry, in order to improve their environmental sustainability and integration into the multi-turn economy (Sweden and Greenland);

• bioeconomics (Sweden and Finland) and bioindustry based on the timber and agro-industrial complex, as well as marine, water and other natural resources (Northern Sparsely Popular Areas (NSPA) in Norway, Sweden and Finland);

• metallurgical, machine-building and machine-tool industries (NSPA in Norway, Sweden and Finland);

• information and communication technologies (Finland), including digitization of health and social services, and robotics (NSPA in Norway, Sweden and Finland);

• telecommunications and electronic technology (Norway), as well as the development of 5G networks, Printed Intelligence, data security, big data and the Internet of things;

• satellite technology, including Galileo, GPS, Glonass and Beidou systems, as well as digital services and automatic vehicle management via satellite navigation (Finland);

• energy production, in particular the use of renewable sources such as biofuels and hydro-, wind and tidal energy, as well as energy recovery from forest waste and resource efficiency (NSPA in Norway, Sweden and Finland) and the development of hydropower and small networks (Greenland);

• services facilitating navigation and other marine activities in the North Atlantic and Arctic (Faroe Islands and Denmark), remote operation of ships (Finland);

• sustainable and environmentally friendly tourism that respects the environment (Greenland, Iceland and the Saami Council), and joint development of tourism products

with more effective transnational cooperation (NSPA in Norway, Sweden and Finland);

- creative industries (Faroe Islands);
- healthcare (Finland) and natural sciences (Faroe Islands and Sweden).

Long-term sustainable cross-border cooperation is one of the most important factors in stimulating investment activity in the Northern territories [22, 23]. This is consistent with the Arctic Investment Protocol of the World Economic Forum, which provides six goals for investors in relation to responsible investment in the Arctic[8]:

- Build resilient societies through economic development.
- Respect and include local communities and indigenous peoples.
- Pursue measures to protect the environment of the Arctic.
- Practice responsible and transparent business methods.
- Consult and integrate science and traditional ecological knowledge.
- Strengthen pan-Arctic collaboration and sharing of best practices.

The content and the main findings of our research

Serious problems in the development of the Arctic regions have led to the realization of the need to find new points of growth, to change the established development guidelines for more environmentally and socially sustainable ones compared to resource-oriented economies, and to the need to revise development strategies [24]. The implementation of the main provisions of the progressive development scenario of the Russian Arctic is expected to be carried out through the activities of three different levels:

1) development of priority sectors of the Russian Arctic economy;

2) development of supporting infrastructure in the Arctic;

3) development of local Arctic life support infrastructure.

The first level includes large-scale investment projects of private companies focused directly on the production of final products, as well as the creation of the necessary auxiliary infrastructure of the main industries (pipelines, high-voltage power lines, etc.), as well as activities aimed at providing scientific support to the development of the Arctic.

The second level includes projects for development of the basic transport and infrastructure framework of the Russian Arctic, especially the new territories of its development, on the principles of public-private partnership (PPP), as well as state projects for restoration and preservation of the environment of the Russian Arctic.

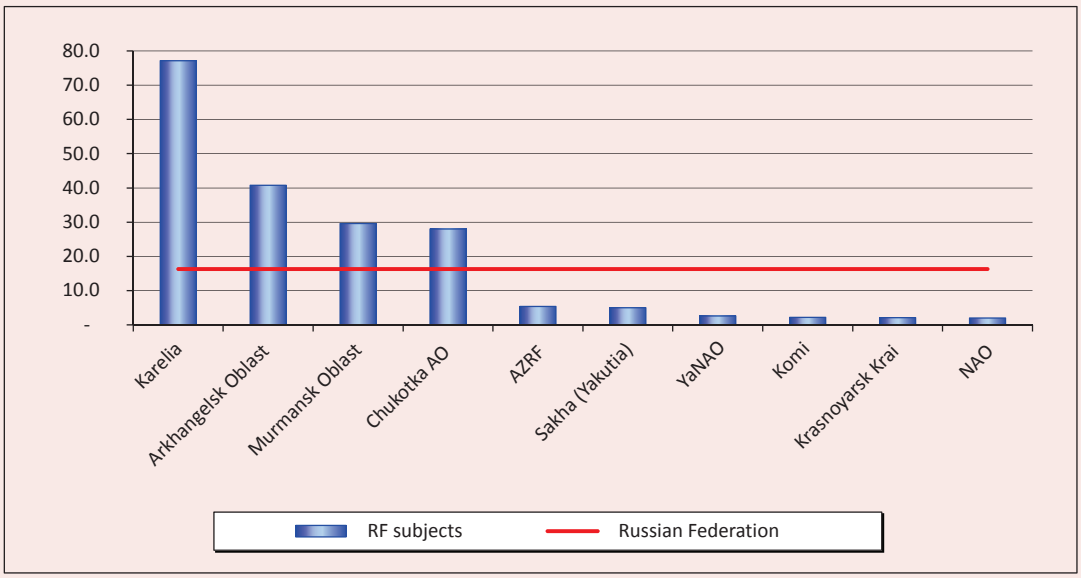
The third level provides the functioning and development of local engineering and social infrastructure in the areas of old and new development.

The set of activities of the second level is considered the most resource-intensive one in terms of budget support. Within its framework, it was planned to implement measures for the construction of motor roads and railways, port facilities that were not included in the federal target program "Development of the transport system of Russia in 2010–2020".

The implementation of these very projects could serve as a transition from a conservative to a target scenario for the development of the Russian Arctic. It is obvious that without the implementation of a number of important tasks of the second level, many large investment projects of private companies lose their relevance because of their low profitability.

[8] Arctic Investment Protocol Guidelines for Responsible Investment in the Arctic. Available at: http://www3.weforum.org/docs/WEF_Arctic_Investment_Protocol.pdf

Figure 2. Proportion of budget funds (budgets of all levels) in the total volume of investments in fixed assets carried out in the Arctic Zone of the Russian Federation, 2017, %



Compiled with the use of the source: The share of budget funds (budgets of all levels) in the total volume of investments in fixed assets carried out on the territory of the Arctic zone of the Russian Federation. Available at: http://www.gks.ru/free_doc/new_site/region_stat/arc_zona/2018_2/pok_2.xlsx (accessed 11.10.2018).

We should emphasize that the cost of major infrastructure projects that are not included in other state programs and that do not have the confirmed state financial support was about 350 billion rubles for the six-year period.

The role of budget funds in the implementation of investment projects in the Arctic is shown *in Figure 2*.

The analysis of statistical data demonstrates the high importance of budget investments in the socio-economic development of the Russian Arctic, especially its Western part. The share of state financing in the structure of investments exceeds the average Russian level in four entities of the Russian Arctic; in all the rest, the value of this indicator is insignificant – less than 5%. The pillar zones of development in the Arctic are designed to become an effective mechanism for attracting investments, including foreign ones. The projects planned to be implemented in the territory of the Arctic Zone of the Russian Federation (on the basis of the pillar zones) include interregional and transcontinental infrastructure projects that create fundamentally new advantages and opportunities.

At the same time, foreign experts say that investment activity in the Arctic faces a number of specific challenges[9]. The choice of investment strategies for the development of the Arctic territories is associated with overcoming significant barriers and finding adequate responses to existing challenges [25]. In particular, in the process of analyzing the implementation of the first period of the European Neighborhood and Partnership

[9] See, for example: The Global Risks Report 2018, 13th Edition, published by the World Economic Forum within the framework of The Global Competitiveness and Risks Team. Available at: http://reports.weforum.org/global-risks-2018/; The great challenge of the Arctic: National Roadmap for the Arctic, June 2016. Available at: https://www.diplomatie.gouv.fr/IMG/pdf/frna_-_eng_-interne_-_prepa_-_17-06-pm-bd-pdf_cle02695b.pdf

Table 2. EU funding of the projects in which the leading partner is the constituent entity of the Russian Federation – in the framework of Kolarctic 2007–2013 Program

Constituent entity of the Russian Federation, the leading partner – program member	EU funding of the projects	
	Thousand euros	%
Arkhangelsk Oblast	1,327,244	18.5
Nenets Autonomous Okrug	1,588,261	22.1
Murmansk Oblast	4,265,442	59.4
Total	7,180,947	100.0
Compiled with the use of [18].		

Instrument ENPI Kolarctic 2007–2013 program, the following development challenges were identified [18, 26, 27]:

- negative demographic trend due to net migration and declining fertility;
- migration of highly skilled youth to central regions;
- significant job losses due to industrial restructuring;
- limited development of the services sector and social sphere;
- insufficient development of logistics;
- lack of modern social infrastructure;
- huge environmental safety risks associated with current and planned production, transportation and storage of oil and gas;
- low level of real incomes of the population.

The tasks of identifying and assessing these challenges are difficult to tackle due to the high level of spatial and socio-economic heterogeneity of the Arctic territories.

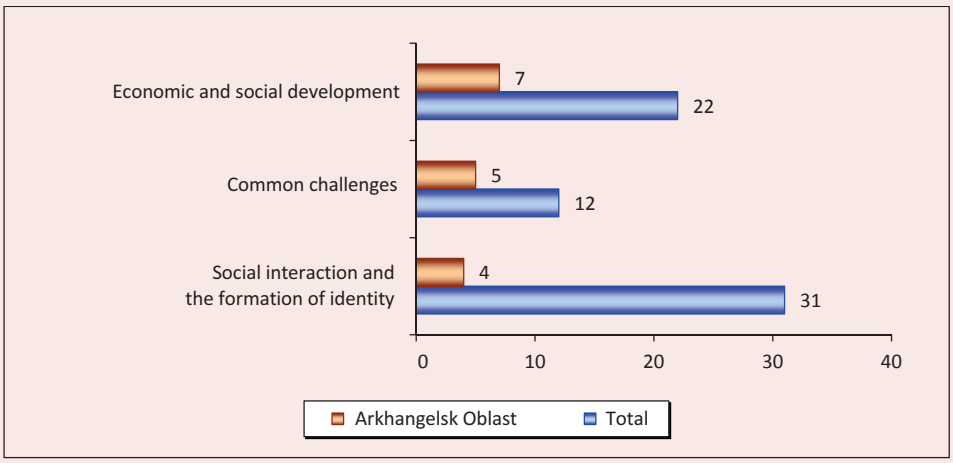
Regional differentiation is a characteristic feature of cross-border cooperation programs implemented in the Northern territories of Russia. Thus, the analysis of the implementation of Kolarctic 2007–2013 program shows a significant scope in the volume of financing of joint projects *(Tab. 2)*.

Fifty one projects received grant support following the results of four application rounds; only three of them belong to large-scale infrastructure projects that were implemented in the Murmansk Oblast (Kandalaksha–Alakurtti–Salla road, reconstruction of Borisoglebsk automobile border-crossing point) and in Nenets Autonomous Okrug (polar renewable energy sources).

The project field of Kolarctic Program includes several directions, but the main infrastructure projects fall under the topic of "Economic and social development" (22 projects out of 65) *(Fig. 3)*.

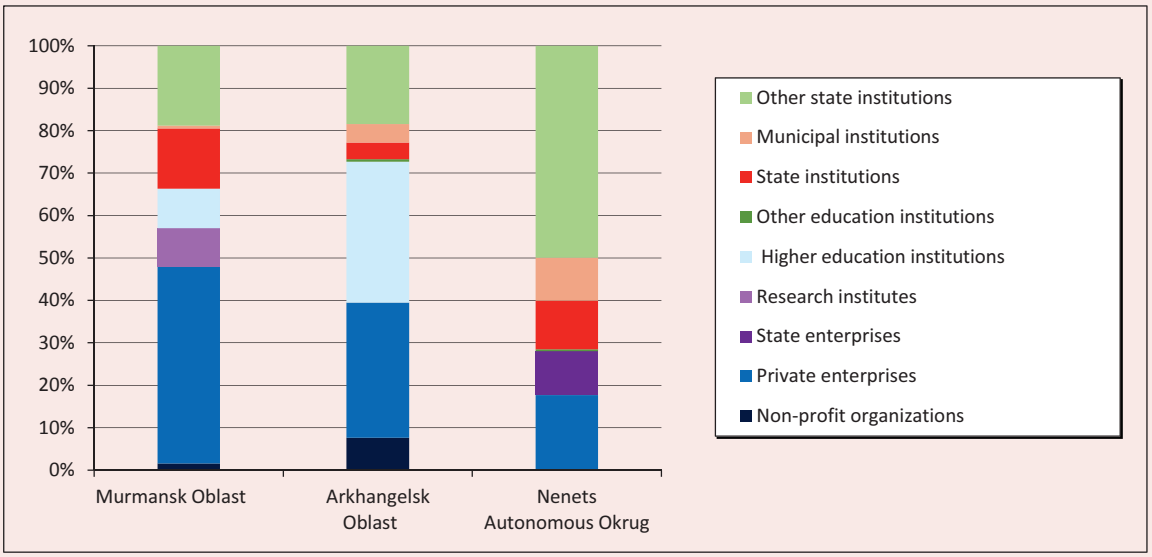
Seven projects in the Arkhangelsk Oblast were supported under this program. And, despite the fact that these projects are not large-scale, specific practical tasks were solved, including the development of road infrastructure through the introduction of innovative Scandinavian ROADEX technologies. The implementation of these projects made it possible to obtain significant effects from participation in international economic integration; it helped attract significant investments and resources to the region, which made it possible to develop and introduce new ideas, technologies, methods and practices. At the same time, judging by the results of the first stage of the program, we reveal the insufficient involvement of regional authorities in the work to initiate and promote large-scale investment projects, to inform and improve the competence of regional business and specialized regional structures in the use of various tools of cooperation.

Figure 3. Distribution of approved projects according to the priorities of the program



Compiled with the use of the source: Georis P., Delcoure L., Levarlet F., Brignani N., Palloni P., Bonne M., Brophy P. Ex-Post Evaluation of 2007-2013 ENPI CBC Programmes. Brussels, 2018. Volume I: Main Report January 2018.

Figure 4. Distribution of the total budget of Kolarctic 2014–2020, broken down by types of organizations



Compiled with the use of the source: Kolarctic CBC – Program 2014–2020: Statistical data of the applications in the second call for proposals. 8.11.2017.

The implementation of the second phase of Kolarctic 2014–2020 has already demonstrated greater involvement of different target groups and stakeholders, including private business *(Fig. 4)*. In the Murmansk Oblast, the share of private enterprises among the partners of the program was almost 50%.

At the same time, the overall activity of the subjects of the Russian Arctic among the 15 Arctic territories remains low *(Tab. 3)*.

The complexity of implementation of investment programs in the European Arctic is revealed in the course of joint consultations of EU institutions. The list of main problems

Table 3. Distribution of the total budget of Kolarctic 2014–2020 by regions

Region	Amount of funds allocated to the program, thousand euros	Proportion of the budget of the territory in the overall budget of the program, %
Murmansk Oblast	5,750	14.7
Arkhangelsk Oblast	2,833	7.2
Nenets Autonomous Okrug	2,109	5.4
Compiled with the use of: Kolarctic CBC – Program 2014-2020: Statistical data of the applications in the second call for proposals. 8.11.2017.		

does not differ from what is typical for the Russian Arctic: access to information on existing investment programs, projects and proposals, as well as the vastness, heterogeneity and inconsistency of the requirements. To address these issues, stakeholders in Denmark and municipalities in the sparsely populated Northern territories of Finland, Sweden and Norway have proposed to create a single entry portal that provides access to all necessary information in one place. The analogue is ISAAFFIK – the Arctic portal of Greenland, created by the Kingdom of Denmark; the portal provides access to a wide range of information about the Arctic. ISAAFFIK is an independent and public forum. The content of the site is supported by a number of partners and participants, including not only representatives of higher education and science, but also state and economic management structures: the Ministry of Higher Education and Science of Denmark, the Geological Survey of Denmark and Greenland, the Ministry of Education, Culture, Research and the Church of Greenland, the Joint Arctic Command.

The overly bureaucratic nature of the process of participation in public investment program, the variability of the rules and reporting requirements are reflected in the increasing administrative burden, which is a real problem for small municipalities with limited staff, and is also seen as a negative factor in terms of economic efficiency. Stakeholders in all the countries of the European Arctic came to the conclusion that it is necessary to define eligible costs, separate direct and indirect costs, use a common set of rules to calculate charges and interpret the results, and harmonize reporting procedures and reduce financial control. In addition, one of the means to overcome funding problems is to increase revenues at the start of the projects implementation or to establish an initial fund to cover costs during the project development phase. With regard to the projects planned for implementation in the Russian Arctic, the possibility of using such tools is not even discussed.

Suggestions and conclusion

Kolarctic Program has a pronounced social orientation. Western countries understand that the discomfort of living in the North should be compensated. Indirect methods in the form of tax and financial preferences and the creation of various special development zones and marketing tools, including the branding of Arctic products, are widely used. At the same time, the forms of support take into account not the nationality of the manufacturer, but its localization in the Northern territories. Such methods are most promoted in three fields: innovative digital production, production of products with local specifics and environmentally friendly products, and the use of special Northern conditions and resources (cold climate technology and bioenergy).

However, there are still a few measures that need to be taken or improved to ensure that

businesses, especially startups, have what they need in order to grow and operate in the Arctic region. The measures are as follows:

• providing effective financial tools to support small and medium-sized enterprises (SMEs) at various stages of their development and to overcome barriers to innovation and growth [28];

• providing maximum support to SMEs to help them enter international markets and find suitable sales channels and partners abroad;

• investments in logistics and infrastructure to support international business development [29];

• investing in high-quality local education, lifelong learning, and research projects.

From the point of view of the possibility of introducing foreign approaches to investment activities in the Russian Arctic, we should particularly note the positive experience of accumulating best investment practices, including public-private partnerships and municipal experience in supporting small and medium-sized businesses (for example, in Lapland). Taking into account the availability of investment passports of the Russian regions, we recommend creating banks of best investment practices in the Northern regions of Russia.

Awareness of the inertia of investment processes in the Arctic leads to the conclusion that it is necessary to develop a strategy to increase the investment attractiveness of the Northern territories, which is based on the following aspects:

• development of regional programs, the implementation of which in practice goes beyond the boundaries of administrative entities ("growth zones") [30];

• creation of a single portal for all planned projects of the Russian Arctic;

• unification of requirements for participation in investment programs and projects;

• formation of a number of advantages for long-term investment of private capital in the development of problem areas: reduced corporate tax rates, absence of sales tax and payroll tax, subsidizing costs ("zones of opportunities");

• active use of marketing tools, including the branding of Arctic products and territories;

• promotion of ready-to-implement infrastructure projects based on cross-border private investment cooperation;

• concentration of public investment in dual-use infrastructure;

• formation of new mechanisms of public-private and multinational partnership, taking into account the Arctic features of the implementation of infrastructure financing models.

In order to ensure consistency in the territorial and temporal aspects of the implementation of priority investment projects on the basis of investment strategies of constituent entities of the Russian Federation with the Arctic territories, we find it appropriate to develop a single investment strategy of the macroregion – the Arctic Zone of the Russian Federation.

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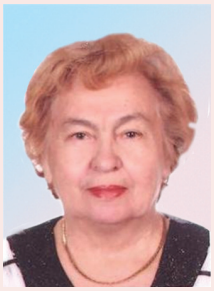
Shaping the Population and Labor Resources in the Russian Far East*



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Abstract. The article is devoted to the problems of demographic situation in the Far East of Russia. It considers the formation of the population and labor potential; shows the dynamics of the population in the Far East according to the all-Union (1989) and all-Russian population censuses (2002 and 2010) and the current population accounting for 01.01.2018; reveals the trend of long-term reduction in the number of inhabitants in the macroregion; substantiates the need to implement the objective to secure population. The relevance of the study is due to the need to determine the risks with the emerging parameters of the natural and migration components involved in the demographic indicators of the Far Eastern region, in the implementation of the strategy to achieve the population according to the Concept of demographic policy in the Far East[1] adopted in 2017. The factors contributing to the reduction of natural population

* In the article, the territory of the Far East is considered within the administrative boundaries at the beginning of 2018. The paper is prepared in the framework of the Complex program of fundamental research of Far Eastern Branch of the Russian Academy of Sciences "Far East", project no. 18-5-045 "Security and sustainable development of the Far East: the transformation of the system of spatial distribution of economic resources amid socio-demographic challenges".

[1] Hereinafter – the Concept.

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growth are covered. The negative role of migration in the population dynamics in the macroregion is noted. Analysis of the transformation of the population structure by age revealed the situation with the reduction of labor potential, which entails the need to attract labor using interregional and external migration. The issues related to the introduction of new parameters of retirement age are highlighted. The article analyzes the dynamics of life expectancy in the Far East and shows its lagging behind the national average. In conclusion, the article presents proposals that can help attract the population to the Far East and secure it.

Key words: population, natural movement, migration, age structure, life expectancy, retirement age, macroregion, region, Russia, Far East, concept.

Introduction

The development of the Far Eastern macro-region is the most important long-term task of the state policy of Russia. There are at least two good reasons for this policy: on the one hand, the current characteristics of labor and population potential[2] significantly limit the socio-economic development of the Far East, on the other – generate long-term risks for the country's national security [1]. The works concerning socio-economic and demographic indicators of the Far Eastern macro-region development record a steady decrease in the population [1; 2, pp. 28-37; 3, pp. 154-161]. The article considers demographic and migration processes in the region and analyzes their compliance with the target indicators, fixed in the program documents for the Far Eastern macro-region development.

In accordance with the adopted Far East demographic policy concept[3], the population is to increase to 6.5 million people by 2025. The planned indicators are to be achieved due to natural population growth, rise in life expectancy and attraction of citizens from other regions of the country and compatriots living abroad to the region for permanent residence.

Researchers in the field of demography differently assess the possibility of sustainable demographic capacity-building in the country as a whole and its regions. However, the cyclical behavior of demographic indicators has always been studied as basic processes depending on the stability of the nature of socio-economic development of the territory [4, 352 p.; 5, pp. 10-17; 6, 214 p.; 7, 76 p.; 8, pp. 57-71; 9, pp. 3-18; 10, 61 p.; 11, 201 p.; 12, 35 1 p.; 13, pp. 67-72; 14, pp. 23-32].

For Russia, as well as for most world countries, there are objective long-term processes of the demographic development of socio-economic subsystems. Russia is a country with clear trends in demographic and migration development, especially in the spatial dimension. The Far East is characterized by a long-term trend of population decline. From this point of view, due to the implementation of various policy documents, it is not clear whether it is possible to influence various aspects of the development of population potential of a macro-region by policy methods. Therefore, the **aim** of the study is to determine possible obstacles to the achievement of the Concept indicators, i.e. population growth. The **tasks** of the study are: 1) analysis of the demographic situation in the Far East of Russia; 2) study of the dynamics of an age structure of the macro-region population and identification of its impact on the regional labor market indicators.

[2] In this study the population potential is understood as a number of population.

[3] The Far East demographic policy concept for the period up to 2025: Decree of the RF Government of June 20, 2017, no. 1298-p. Available at: http://government.ru/docs/28228/

In comparison with the available research, this paper defines the possibilities and limitations of the impact of modern state policy measures on the development of population potential of the Far East regions. This determines the **scientific novelty** of the study. The present work is made by the authors on the basis of the postulates of the Russian scientific school of population, founded by D.I. Valentei. The principles laid down in this school are reflected in the analysis of the formation of population and labor resources of the Far East.

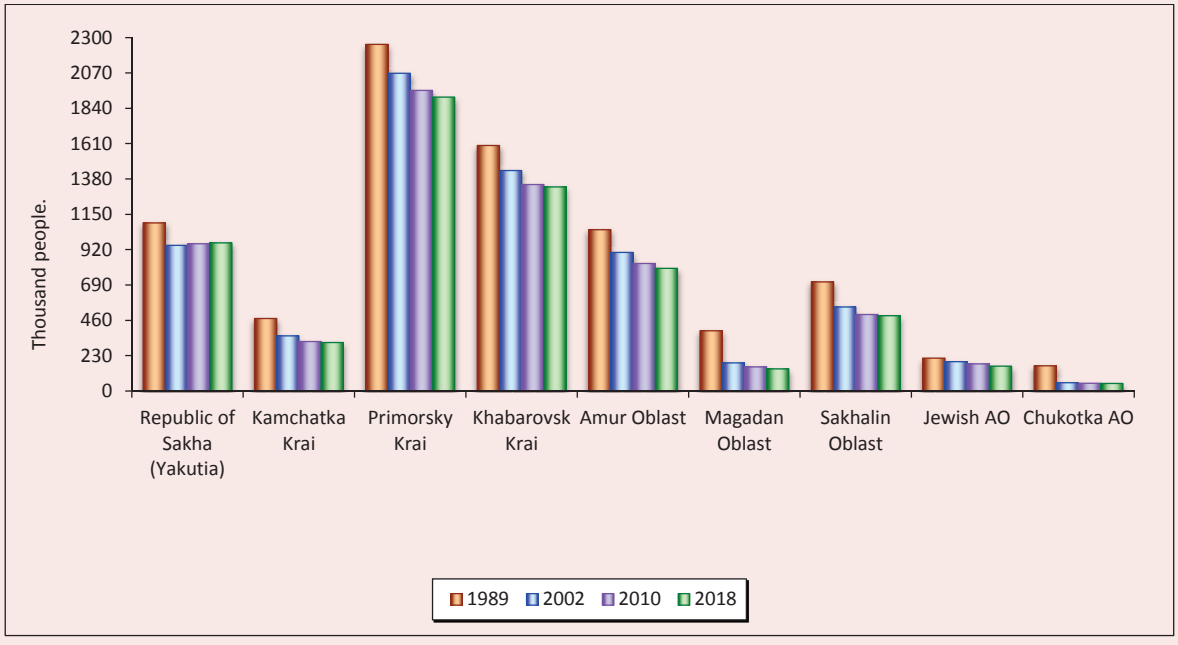
Migration and demographic development of the Far Eastern macro-region: current trends

Despite the fact that the paramount importance of the Far East development is widely discussed, the region is losing its population (*Fig. 1*).

As of January 1, 2018, 6,165,284 people in the Far East lived[4]. For the period from 1991 to 2017, the region lost 1,898.3 thousand people, i.e. 23.5%, including in 2017 – 17.4 thousand persons, or nearly 0.3%.

Will the Far East be able to achieve the expected population in accordance with the adopted Concept? The strategic goal of regional socio-economic development is to stabilize the population at the level of 6.2–6.3 million people by 2020 and to increase is to 6.5 million people by 2025. It is expected to achieve these figures at the expense of natural growth (increase in fertility, decrease in mortality), rise in life expectancy to 76 years and migration – attracting citizens from other regions of the country and compatriots living abroad to the region for permanent residence.

Figure 1. Population in the Far Eastern regions



Note. 1989, 2002 and 2010 – according to the census, 2018 – as of the beginning of the year, thousand people

Sources: compiled by the authors on the basis of the State Statistics Committee of the RSFSR and Russia.

[4] Estimation of the permanent population as of January 1, 2018 and the average for 2017. Federal State Statistics Service of the Russian Federation. Available at: http://www.gks.ru/free_doc/new_site/population/demo/PrPopul2018.xlsx/

Table 1. Indicators of demographic development of the Far Eastern macro-region

Macro-region, region	Population, thousand people (as of January 1)			Coefficients of natural population growth (per 1,000 people)	
	2017	2018	2018 in % to 2017	2016	2017
Far East	6,182.7	6,165.3	99.7	0.8	0.05
Republic of Sakha (Yakutia)	962.8	964.3	100.2	7.6	6.4
Kamchatka Krai	314.7	315.6	100.3	1.4	0.9
Primorsky Krai	1,923.1	1,913.0	99.5	-1.4	-2.4
Khabarovsk Krai	1,333.3	1,328.3	99.6	0.3	-1.0
Amur Oblast	801.8	798.4	99.6	-0.8	-1.6
Magadan Oblast	145.6	144.1	99.0	-0.2	-0.5
Sakhalin Oblast	487.4	490.2	100.6	1.1	1.0
Jewish Autonomous Oblast	164.2	162.0	98.7	-1.8	-1.6
Chukotka Autonomous Okrug	49.8	49.4	99.2	3.6	3.7

Sources: Population and migration of the Russian Federation in 2017. Available at: http://www.gks.ru/bgd/regl/b18_107/Main.htm; Natural movement of the RF population. Available at: http://www.gks.ru/bgd/regl/b17_106/Main/htm /

It is regrettable to recognize that virtually none of these aspects are currently working for population growth in the region. The calculations provided in the Concept contain certain risks. Since 2017 the natural population growth in the Far East has practically become zero (*Tab. 1*). In addition, the region has not been able to achieve a zero migration balance by 2018 due to ongoing migration [15, pp. 37-42].

These data show that the natural movement in the Far Eastern region after a short growth, associated with the entry of a larger generation into the reproductive age and the introduction of maternal capital, again demonstrates its negative impact on population dynamics. However, the positive trend remains in the Republic of Sakha (Yakutia), Kamchatka Krai and the Sakhalin Oblast, but the indicators values are lower than in 2016. Only in ChAO (Chukotka Autonomous Okrug) the positive value of natural growth increased, but its role was offset by migration, as the population number at the beginning of 2018 was less than as of January 1, 2017. We should note that current population forecasts for 2030[5] and demographers' studies [16, pp. 192-193] show a reduction in the number of women of reproductive age. Hence, the visible increase in fertility is unlikely despite implemented policies to raise a number of children in the family [17, p. 26; 18, p. 105; 19] and, therefore, it may have a negative impact on the total population in the Far East.

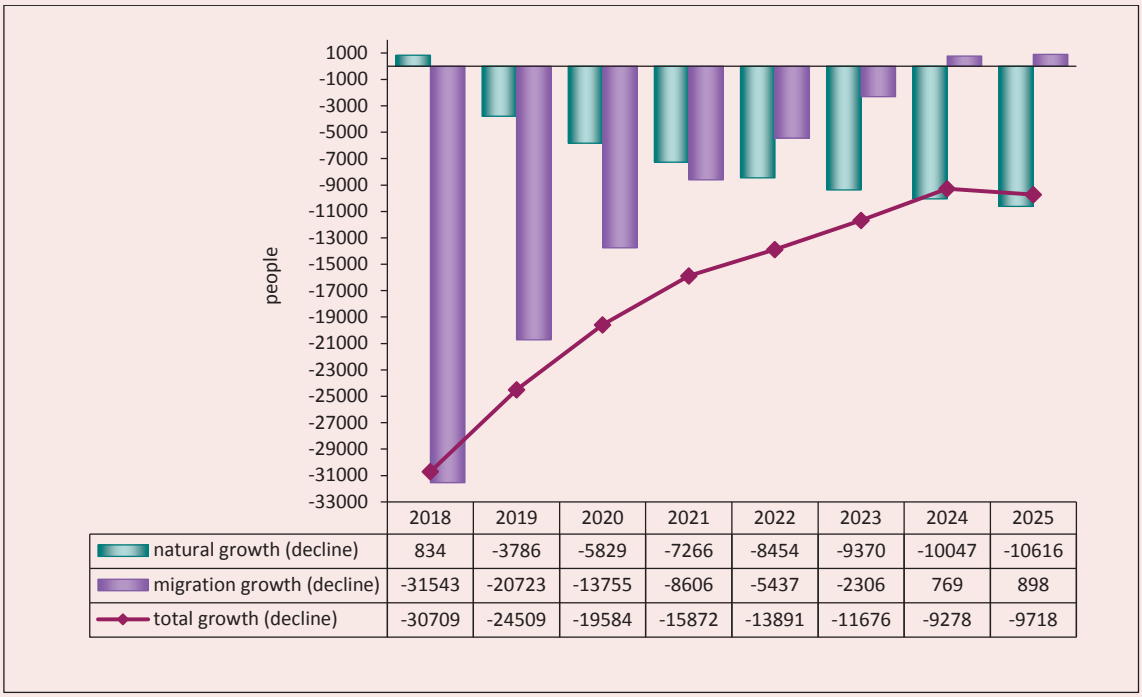
Intensification of the continuing population outflow from the Far Eastern macro-region is the main factor of its number reduction. In 2017 all nine subjects of the region showed a negative migration balance, which amounted to 17.4 thousand people[6]. Its decrease and the appearance of a positive value are to be recorded since 2024. However, the negative value of the population natural movement indicator is growing, and to increase a number of inhabitants in the region is hardly possible. It, of course, is contrary to the accepted Far East demographic policy concept (*Fig. 2*).

Migration losses of the Far East are mainly due to interregional migration flows, which show a disappointing fact: the total losses of the population from migration as a whole

[5] Demographic forecast up to 2030. Available at: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/rustatistics/population/demography/

[6] Population and migration of the Russian Federation in 2017. Federal State Statistics Service of the Russian Federation. Available at: http://www.gks.ru/bgd/regl/b18_107/Main.htm/

Figure 2. Forecasted values of the Far Eastern macro-region population by components



	2018	2019	2020	2021	2022	2023	2024	2025
natural growth (decline)	834	-3786	-5829	-7266	-8454	-9370	-10047	-10616
migration growth (decline)	-31543	-20723	-13755	-8606	-5437	-2306	769	898
total growth (decline)	-30709	-24509	-19584	-15872	-13891	-11676	-9278	-9718

Sources: a medium version of the forecast of natural, migration and total population growth by RF subjects. Available at: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/population/demography/

exceed in the interregional flows, [20]. It should be noted that in the migration process studies the inter-country research prevails in countries of the world, [21; 22; 23], and the intra-regional migrations are studied mainly in terms of developing countries [24; 25; 26; 27].

For Russia, including the Far East, as a territory extended in geographical space, interregional migration is of greater importance, which, in turn, is determined by structural and institutional features of the Russian economy [28]. But we have to admit that the problems of long-term migration outflow from the Far East to central regions of the country have not found proper attention among the management structures [14, pp. 23-32]. It is likely due to the fact that for many years the population in Russia's Eastern regions has steadily increased because of migration. We can not but agree that "the causes of migration are not that other, as person's reaction (his/her needs, attitudes, value orientations) to the factors that interact with this phenomenon" [29, pp. 51-61]. In inter-regional migration the centers of attraction are the city of Moscow and the Moscow Oblast, the city of Saint Petersburg and the Leningrad Oblast, Krasnodar Krai. Migration relations with the mentioned region even tend to increase. In the 2016 – 2017 negative migration flow they included more than 60% of the migrants from the Far East [15, pp. 37-42]. This is no accident. The Far East regions lag behind many subjects of the European part of Russia significantly in terms of per capita real income. This is the result of apparent divergence between population's incomes and general economic indicators due to the specifics of income distribution. The

Table 2. Rating of the Far East regions according to the data on the distribution of a number of employees by wages, April 2017

Macro-region, region	Share of workers with wage above 100 thousand rubles / month,%	Share of workers with wage below 9 thousand rubles / month,%	Median wage value, rubles	Ratio of median wage to subsistence minimum of working population
Republic of Sakha (Yakutia)	11.6	0.6	46,028	2.6
Kamchatka Krai	12.0	1.4	50,464	2.5
Primorsky Krai	4.0	1.3	32,720	2.5
Khabarovsk Krai	5.0	0.8	35,470	2.6
Amur Oblast	4.1	3.8	31,640	2.6
Magadan Oblast	16.2	0.1	53,729	2.8
Sakhalin Oblast	13.4	-	48,792	3.4
Jewish Autonomous Oblast	1.9	2.3	28,711	2.1
Chukotka Autonomous Okrug	23.0	0.3	65,696	3.1
For reference: Moscow	18.6	0.7	55,434	3.0
Saint Petersburg	8.5	0.8	43,136	3.6

Source: Information on the distribution of an employee number by a wage size. Available at: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/publications/catalog/11c4980041c1bcbf9ee9fe27f9898572 (tab10, tab32).

growth of real per capita income in the macro-region is unstable due to the features of the Far East economy functioning in the framework of the domestic economic space and transport remoteness from the Western regions [30, pp. 799-813]. Let us consider a factor, significant for the population, such as a real average monthly wage, which in 2017 amounted to 103.9% in the Central Federal District, compared to the previous year, 103.7% in the Northwestern Federal District and 102.9% in the Far Eastern Federal District[7] [31, pp. 30-32] (*Tab. 2*).

The indicators given in Table 2 do not accidentally lead to the understanding that in the Far Eastern macro-region there has been and will always be a certain part of the population, focused on moving to the Center, where life is more comfortable in many ways. Mostly it is Moscow, Saint Petersburg and the Moscow Oblast that attract the population and labor resources. This trio has been at the rating top for many years, as it has high rating points, yet unattainable for other regions. Most likely, this situation will not change in the coming years. Development of infrastructure, a high level of economic and social development, high potential for further development allow these regions to gain a foothold in the top of the rating for a long time [32, pp.26-30]. It has been repeatedly stressed that it is very difficult to change a current situation in the interregional exchange of the Far East with other Russian regions in the conditions of socio-economic differentiation: quality of life is relatively lower here, and modern benefits are no longer an effective tool for consolidating the population [33, pp. 10-12].

It is difficult to agree that 50%, that is every second of the respondents participated in the VTsIOM survey in 2018, is ready to move to the Far East if they are provided with one-time

[7] Social and economic situation of Federal districts in 2017. Federal State Statistics Service of the Russian Federation. Available at: http://www.gks.ru/bgd/regl/b17_20/Main.html

payments in the amount of up to 1 million rubles. At the conference "Demographic development of the Far East" held on Sakhalin March 27–28, 2018, the optimistic data were announced following the results of the survey, conducted by VCIOM: if such a measure is proposed, then every fifth – 19% of the respondents will think about moving to the Far East[8]. Surely, in general, it would seem positive for the region. But it seems that neither one nor the other indicator is real for the Far East. The total number of the Far Eastern Federal District residents thinking about changing their place of residence remains high – 38%[9].

Positive migration cooperation with the CIS countries has decreased. This is clearly illustrated by the data even for the last two years: in 2016 the share of departures to the CIS countries was 62.4% of the number of arrivals, in 2017 this figure rose to 69.6%. This situation is developing contrary to the previous assumption that migration from the CIS countries can play a positive role in the dynamics of the Far East population. First high expectations were associated with the Russian-speaking population of the former Soviet republics. Now it should be recognized that this reserve is almost exhausted, and those who still intend to decide to change their place of residence in favor of the Russian Federation are unlikely to choose the Far East.

Foreign countries have reduced their presence in the Far East: the positive migration balance in 2015 amounted to only 15.6% of the 2011 level (2,860 people in 2011 and 445 people in 2015), and in 2016 and 2017 these countries gave a negative migration balance[10].

Perhaps, here we can agree that the level of life expectancy of the population in the Far East plays a certain role in determining migration behavior. According to the Center for Regional Economic Studies, the Far East of Russia occupies the worst position in the ranking of life expectancy. The Republic of Sakha (Yakutia) ranks 44th, Primorye – 64th, Khabarovsk Krai – 72nd. The rest of the subjects occupy the lowest lines of the rating: Kolyma – 73d, Sakhalin – 75th, Kamchatka – 76th, the Amur Oblast – 78th, Jewish Autonomous Oblast – 80th, Chukotka – 81st (ChaO). Only the Tuva Republic population lives less, than in ChAO. Thus, it can be figuratively said that the Far East has fallen down in the life expectancy ranking [34].

Let us note that in Russia in 2017 life expectancy at birth, according to the Federal State Statistics Service of the Russian Federation, amounted to 72.7 years, including 67.5 years for men and 77.6 years for women.

What about the life expectancy indicator in the Far East of Russia? (*Tab. 3*).

According to the latest forecast estimates, provided by the Federal State Statistics Service of the Russian Federation (the average forecast), life expectancy at birth in Russia will be 72.9 years in 2018, and 70.4 years in the Far East (see tab. 4) – lagging behind the all-Russian indicator will continue and will amount to 2.5 years.

[8] Survey mark. *Young Resident of the Far East,* April 4–11, 2018.

[9] Kornienko E. And again outside. Why almost 40% of the Far East residents want to leave the region. *News,* April 10, 2018. Available at: https://iz.ru/729123/ekaterina-korinenko/i-snova-krainie/

[10] Population and migration of the Russian Federation in 2017. Federal State Statistics Service of the Russian Federation. Available at: http://www.gks.ru/bgd/regl/b18_107/Main.htm/; Population and migration of the Russian Federation in 2016. Federal State Statistics Service of the Russian Federation. Available at: http://www.gks.ru/bgd/regl/b17_107/Main.htm/

Table 3. Life expectancy at birth in 2017, years

Macro-region, region	Total population			Urban population			Rural population		
	Total	Men	Women	Total	Men	Women	Total	Men	Women
Far East	70.09	64.80	75.53	70.64	65.21	76.02	68.34	63.53	73.84
Republic of Sakha (Yakutia)	71.68	66.39	77.07	72.27	66.98	77.39	70.42	65.04	76.37
Kamchatka Krai	70.06	65.21	75.25	70.83	65.71	76.00	67.21	62.77	71.93
Primorsky Krai	70.36	65.34	75.50	71.01	65.82	76.13	68.22	63.81	73.29
Khabarovsk Krai	69.74	64.23	75.30	70.02	64.39	75.54	68.31	63.41	73.82
Amur Oblast	69.06	63.66	74.61	69.64	63.91	75.20	67.80	63.06	73.28
Magadan Oblast	69.37	63.41	75.49	69.74	63.70	75.82	61.76	55.73	68.36
Sakhalin Oblast	70.19	64.59	76.09	70.57	64.79	76.38	68.30	63.01	74.57
Jewish Autonomous Oblast	68.83	63.35	74.35	69.69	63.89	75.32	66.93	62.11	72.07
Chukotka Autonomous Okrug	66.10	60.33	71.66	69.11	66.34	76.01	55.65	49.58	61.63

Source: Main Interregional Center for Processing and Dissemination of Information of the Federal State Statistics Service of the Russian Federation (Table 3TCE).

Table 4. Life expectancy of the Far Eastern population (average forecast), years

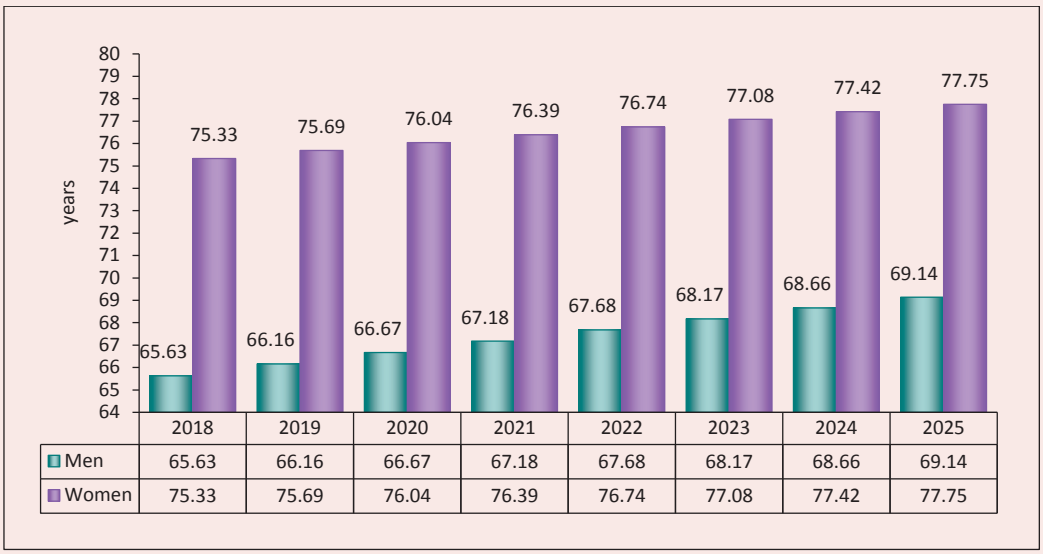
Macro-region, region	2018	2019	2020	2025
Far East	70.39	70.85	71.29	73.41
Republic of Sakha (Yakutia)	71.69	72.07	72.46	74.32
Kamchatka Krai	70.12	70.56	71.00	73.11
Primorsky Krai	70.91	71.36	71.79	73.88
Khabarovsk Krai	70.35	70.81	71.27	73.45
Amur Oblast	69.16	69.62	70.08	72.27
Magadan Oblast	69.88	70.35	70.81	73.03
Sakhalin Oblast	70.02	70.49	70.96	73.18
Jewish Autonomous Oblast	67.47	67.99	68.49	70.91
Chukotka Autonomous Okrug	66.28	66.87	67.45	70.19

Source: Life expectancy in the RF regions (average forecast). Available at: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/population/demography/

On October 3, 2018, the Law of the Russian Federation No. 350-FZ "On raising the retirement age in Russia" was signed. The main change proposed by the law is to increase the retirement age for Russians by 5 years – that is, from 60 to 65 years for men and from 55 to 60 years for women. The transition to the new values is proposed to be carried out gradually, starting from January 1, 2019[11]. The adopted law stipulates a "step-by-step transition" of retirement – until 2028. Taking into account the difference in life expectancy of the average Russian and Far Eastern indicators, we note that the introduced retirement order may boost the population outflow from the Far East (to the places where living is more comfortable and life expectancy is higher). According to the calculations of life expectancy of the Far East population, it is possible to imagine and compare survival probability in the region, taking into account the difference in its duration with Russian indicators (*Tab. 4*).

[11] On raising the retirement age in Russia: Law No. 350-FZ. Available at: https:// pensija.molodaja-semja.ru/reforma/zakon-o-pensionnom-vozraste-2018.

Figure 3. Forecasted values of life expectancy in the Far East by gender, years



	2018	2019	2020	2021	2022	2023	2024	2025
Men	65.63	66.16	66.67	67.18	67.68	68.17	68.66	69.14
Women	75.33	75.69	76.04	76.39	76.74	77.08	77.42	77.75

Source: Life expectancy in the RF regions (average forecast). Available at: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/population/demography/

Table 5. Far Eastern Federal District subjects in the rating of regions by quality of life

Region	Position in the rating in 2016	Position in the rating in 2017
Khabarovsk Krai	36	30
Kamchatka Krai	32	35
Amur Oblast	47	41
Magadan Oblast	39	44
Primorsky Krai	51	48
Sakhalin Oblast	53	53
Republic of Sakha (Yakutia)	71	71
Chukotka Autonomous Okrug	77	78
Jewish Autonomous Oblast	81	80
Source: Zubritskii A. Statistics does not give a correct idea of the outflow scale. *Far Eastern Capital*, 2018, no. 6 (214), pp. 26-30.		

The data given in tables 3 and 4 raise some doubts about the achievement of the estimated life expectancy of 73.41 years in the Far East by 2025.Moreover, it should be noted that in this case (see tab. 3) the average life expectancy for the entire population is shown and this indicator is lower for men (*Fig. 3*).

Life expectancy is a mirror of the level and quality of life. Meanwhile, as the researchers note, the level of life of Russians is declining for a number of years [32, pp. 26-30; 35, pp. 127-142] (*Tab. 5*). It is no accident that the Far Eastern subjects do not occupy the best positions in the Russian regions ranking in terms of life quality.

Dynamics of the age structure of the Far Eastern population and its impact on the regional labor market.

Many-year natural decline together with the migration outflow contributed to the transformation of the population age structure in the Far Eastern macro-region – a reduction in the working-age population and an increase in the number of older people (*Tab. 6*).

These data indicate that in 2018, compared to 2010, the following changes in the population age structure were observed: the proportion of persons younger than the working age went up by 2.4 percentage points and the share of persons older than the working age – by 3.3 percentage points, the proportion of working age population went down by 5.7 percentage points. These transformations in the age structure are comparable with the national ones [36, pp. 215-223]. According to the calculations made on the basis of current trends in demographic development, the ratio of age groups in 2025 can be the following: younger than the working age is 17.2%, of the working age – 57.3% and older than the working age – 25.5% [3, p. 157]. The forecast estimates

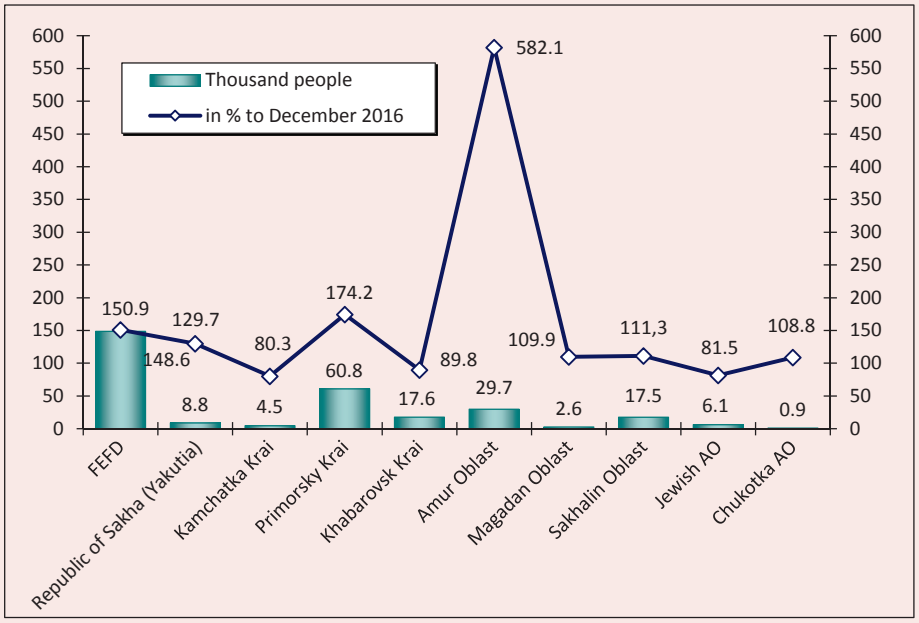
Table 6. Distribution of the Far Eastern population by age (as of the beginning of the year), in %

Macro-region, region	Older than the working age		Of the working age		Younger than the working age	
	2010	2018	2010	2018	2010	2018
Far East	19.1	22.4	63.5	57.8	17.4	19.8
Republic of Sakha (Yakutia)	12.7	17.0	64.0	58.1	23.3	24.9
Kamchatka Krai	17.3	20.6	65.6	60.6	17.1	18.8
Primorsky Krai	21.6	24.7	63.1	57.5	15.4	17.8
Khabarovsk Krai	20.7	23.0	63.7	58.2	15.6	18.8
Amur Oblast	19.5	23.0	62.4	56.6	18.1	20.4
Magadan Oblast	16.7	21.4	66.5	59.7	16.8	18.9
Sakhalin Oblast	19.6	23.4	63.7	57.1	16.7	19.5
Jewish Autonomous Oblast	19.3	22.9	62.2	56.0	18.5	21.1
Chukotka Autonomous Okrug	10.3	14.7	67.7	62.3	22.4	23.0
Sources: compiled by the authors on the basis of the data provided by the Federal State Statistics Service of the Russian Federation.						

Table 7. Need for workers declared by employers to the employment service, and a number of foreign citizens with a valid work permit (as of the end of the year)

Macro-region, region	Need for workers declared by employers to the employment service, persons			Foreign citizens with a valid work permit, persons		
	2012	2016	2017	2012	2016	2017
Far East	112,119	98,426	148,563	81,786	30,135	24,583
Republic of Sakha (Yakutia)	10,706	6,822	8,849	9,003	440	318
Kamchatka Krai	4,739	5,564	4,469	4,296	227	183
Primorsky Krai	44,927	34,893	60,790	26,592	11,458	10,148
Khabarovsk Krai	18,677	19,602	17,610	18,052	7,588	5,986
Amur Oblast	13,477	5,104	29,710	8,430	3,582	3,327
Magadan Oblast	4,790	2,344	2,575	497	588	510
Sakhalin Oblast	8,746	15,767	17,548	9,790	3,672	2,988
Jewish Autonomous Oblast	5,076	7,524	6,135	3,862	2,545	1,084
Chukotka Autonomous Okrug	981	806	877	1,264	35	39
Source: Socio-economic situation of federal districts – 2017. Available at: http://www.gks.ru/bgd/regl/b17_20/Main.htm /						

Figure 4. Need for workers declared by employers to the employment service by subjects of the Far East (as of the end of December 2017)



Source: Socio-economic situation of the federal districts – 2017. Available at: http://www.gks.ru/bgd/regl/b17_20/Main.htm/

predict deterioration of the situation with the age population structure in the future, a decline in economic complex's need for labor force and a rise in the demographic burden of older people on the working age population[12]. Therefore, despite the fact that the Far East is characterized by a low and recently declining level of total unemployment (6.4% in 2014 and 5.6% in 2017), the region is interested in attracting labor resources, as employers feel the need for labor resources. However, it should be noted that due to changes in the employment specifics, the indicators of the need for foreign workers tend to decrease. In this regard, the number of foreign citizens with a valid work permit is going down (*Tab. 7*).

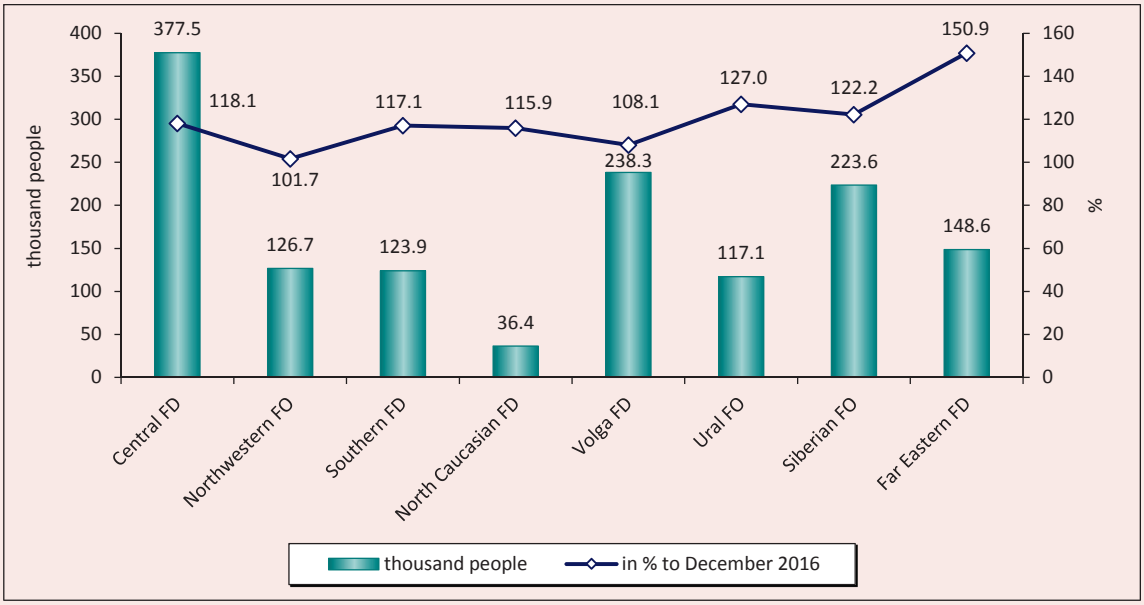
Attention is drawn to the change in the need for workers in 2017 in certain subjects of the Far Eastern region relative to 2016, caused not only by the specifics of economic development, but also by the change in the working age population share (*Fig. 4*).

At first glance, it would be advisable to meet the need for workers by increasing labor mobility and attracting people to the Far East from other Russian regions. However, at present the Far Eastern region itself is a donor of population and labor resources for other RF subjects that experience limitations or lack of labor resources (*Fig. 5*).

Migration is a major factor in population ageing in the conditions when a number of working age people who have left the region prevails over those who have arrived. In 2017, 70.5 thousand of the working-age population arrived in the Far East from other Russian regions, and 84.7 thousand people left in the opposite direction. Hence, the prevalence of the first group of people exceeds 20% (*Tab. 8*).

[12] Lisitsyn Yu.P. Public health and healthcare: textbook. Edition 2. Moscow: GEOTAR-media, 2010. 512 p.

Figure 5. Need for workers declared by employers to the employment service bodies by federal districts (as of the end of December 2017).)



Source: Socio-economic situation of the Federal districts-2017. URL: http://www.gks.ru/bgd/regl/b17_20/Main.htm/

Table 8. Arrived and left working age population in subjects of the Far East in 2016–2017, persons

Macro-region, region	2016			2017		
	Arrived	Left	Left, in % to the arrived	Arrived	Left	Left, in % to the arrived
Far East	70,432	85,335	+21.2	70,508	84,719	+20.2
Republic of Sakha (Yakutia)	9,883	12,952	+31.1	9,666	12,703	+31.4
Kamchatka Krai	5,040	6,430	+27.6	4,829	6,284	+30.1
Primorsky Krai	16,180	18,822	+16.3	16,036	18,900	+17.9
Khabarovsk Krai	16,854	19,420	+15.2	16,436	18,919	+15.1
Amur Oblast	7,234	9,387	+29.8	7,258	9,364	+29.0
Magadan Oblast	2,880	3,760	+30.6	2,983	3,802	+27.5
Sakhalin Oblast	7,566	8,285	+9.5	8,550	8,310	-2.8
Jewish Autonomous Oblast	2,120	3,298	+55.6	2,023	3,293	+62.8
Chukotka Autonomous Okrug	2,675	2,981	+11.4	2,727	3,144	+15.3

Sources: Population and migration of the Russian Federation in 2016. Federal State Statistics Service of the Russian Federation. Available at: http://www.gks.ru/bgd/regl/b17_107/Main.htm; Population and migration of the Russian Federation in 2017. Federal State Statistics Service of the Russian Federation. Available at: http://www.gks.ru/bgd/regl/b18_107/Main.htm

In Primorsky Krai, the Jewish Autonomous Oblast, the Republic of Sakha (Yakutia), Chukotka Autonomous Okrug and Kamchatka Krai, the ratio of departures and arrivals of working age population increased. In perspective this ratio will determine the specifics of the labor market in the Far Eastern macro-region. Consequently, it is very problematic to increase a population number and form labor resources in the Far East at the expense of interregional migration. We can agree with the widespread opinion that

"this problem can not be solved by means of migration policy measures, focused on attracting migrants from other regions of the country" [37].

Research results. On the basis of the study results it is possible to make a short-term forecast on possible risks (as mentioned above) in the nature of formation of demographic, including labor, potential in the region, that is, in the implementation of the fundamental indicators stipulated by the Far East demographic policy concept. The current model of its demographic development indicates a promising reduction in the number up to 5.9 million people by 2030, which corresponds to the number of half a century ago. Accordingly, within the framework of the model trend, an even greater decrease in the Far Eastern population may occur by the middle of the 21st century – to 5.2–5.4 million people (the 1959 level). Hopefully, the situation would change in a positive direction, but, as repeatedly said, it needs a sustainable demographic development and a fundamentally new socio-economic mechanism to attract and retain population in the territories [38, pp. 69-81; 39, pp. 40-50]. In our opinion, it is necessary to [15, pp. 37-42; 31, pp. 30-32; 32, pp. 26-30]:

– constantly monitor the demographic and migration situation in the Far East;

– solve the issue of transport accessibility (connection with RF regions) and year-round subsidizing of traveling of the Far Eastern population by air and rail;

– preserve regional coefficients and introduce experience allowances to wages for long service in the Far East (this will reduce interregional differences in the level and quality of life of the population and increase interest in living and working in the Far East);

– form modern high-paid jobs designed for the employment of Russian labor resources and creating incentives for the growth of Far Eastern population [40, pp. 83-90];

– introduce quotas at regional universities and the Far Eastern Federal University for Far Eastern school leavers;

– not extend the law on working pensioners (indexation of pensions) in the subjects of the Far East.

These proposals were discussed and supported at the Project workshop "Far East – space of the future", organized by the Federal Autonomous Scientific Institution "Eastern Center of State Planning" in October 2018 in Khabarovsk. Another proposal was worked out:

– to create a special migration regime in the Far East, involving the facilitation of citizenship.

Since the demographic factor is the most important condition for social development, the implementation of the given measures will allow the region to obtain better demographic results.

Conclusion. The analysis shows that the trend of long-term population decline is observed in the Far East.

Natural movement of the Far Eastern population still continues to have a negative impact on population dynamics after a short growth associated with people's achievement of reproductive age. In the short term, a visible increase in the birth rate is unlikely even with the implementation of various types of state policy aimed at increasing childhood in the family. Therefore, since natural movement of the population is negative, an increase in a number of inhabitants in the macro-region is not possible, which contradicts the targets of the adopted Far East demographic policy concept.

Intensive population's outflow from the Far East is one of the main factors in reducing its number. In the post-Soviet period there is a certain part of the population, whose behavior is determined by the desire to move to western regions of the country. The Far Eastern regions lag behind many subjects of the European part of Russia in terms of real per capita income. Therefore, migration losses are formed mainly at the expense of interregional migration flows. To revert the trend in the foreseeable future is impossible in the conditions of existing socio-economic differentiation: the quality of life here is relatively lower and modern tools, such as various benefits, do not prove its effectiveness.

The macro-region's positive migration interaction with the near abroad countries has decreased, which contradicts the assumption of the positive role that migration from the CIS countries plays in the dynamics of population. It should be recognized that the expectations associated with the attraction of Russian-speaking population of the former Soviet republics are not realized.

Representatives of foreign countries have reduced their presence in the Far East. However, sustainability of this trend depends largely on economic success.

The conducted work shows that the Far East occupies the worst position in the ranking of life expectancy. The data given in the article give reason to doubt the achievement of estimated average life expectancy of the Far East population by 2025, according to the Concept.

Long-term natural decline in the conditions of migration outflow involves changes in the population age structure in the Far East. Migration outflow of the working age population and the youth contributes to the increase in the share of older generation. Population growth and massive formation of labor resources due to interregional migration seem unattainable in the foreseeable future. In the long term, this circumstance will determine the specifics of the macro-region's labor market, doubting the implementation of the goals of accelerated development of its economy.

We have to admit that almost none of the incentives for population growth in the macro-region are working nowadays. Perhaps, the calculations provided for in the Concept do not have regard to certain risks. In the executive authorities' programs, the formation of population[13] and labor resources probably should not be any independent benchmark. It is entirely possible that the long-term formation of population and labor resources in the Far East requires its economy development, which can increase population's real incomes, comparable to those of other successful countries and regions. It is also necessary to be ready to ensure progressive development of the macro-region's economy in the conditions of its low population level, since it is not possible to change a long-term trend of population reduction in the Far East in the foreseeable future.

[13] The term "formation of population" refers to the increase or decrease in population under the influence of demographic and migration processes.

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Modernization of a Region as a Heterarchical System

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Abstract. Modern world is dynamic, variable and full of risks, which requires the development of flexible and dynamic mechanisms to modernize regional social systems. For modern Russian regions, different in pace of development and people's quality of life, it is important to develop such theoretical and methodological approaches to based to identify resources and problem areas of modernization. The research novelty lies in the analysis of modernization in a region using the theoretical and methodological capabilities of the system approach, the concepts of heterarchy and modernization. We emphasize the overlap of subject fields of terms "heterarchy", "region", and "modernization" in matters of principles (value basis) of modernization process management in the region using the heterarchy resources. Based on the results of the monitoring sociological study conducted during 2010–2016 in the Astrakhan Oblast sing the interview method at the place of residence according to the Standard Methodology of the all-Russian program "Socio-Cultural Evolution of Russia and its Regions", we revealed the strengthening of the vertical of power, that is, hierarchical relations in the institutional and regulatory sphere. The growing institutional heterarchy, whose purpose is to complicate and imitate social institutions, is manifested

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in predominant non-market motivation among the residents of Astrakhan, as well as in fluctuations in values of market and non-market motivation, depending not only on the socio-economic, but also political situation. The imitation of socio-economic institutions demonstrates the dysfunction of life-supporting sphere of the region's socio-cultural space and is a problem area of modernization of the region. Intellectual heterarchy ("the war for standards") is fixed in reducing support for basic values simultaneously with the strengthening of primary social networks in the structure of the background knowledge of the region's population. Moreover, the changed system of values is manifested in the reduced standard of social claims regarding the perception of the standard in assessing own health and the environment. Intellectual heterarchy in the region is complemented by geographical one as migration substitution of the population in a region with higher social demands by the carriers of nomadic mentality with low social claims. The existing heterarchies may indicate that the Astrakhan Oblast as a system is close to the reorganization phase which means the transition of the region's system to a more sustainable state due to its simplification. With appropriate organizational design, low social claims of the region's population may become the modernization resource of the region.

Key words: region, modernization, heterarchical system.

Introduction

The complex concept of "region" in modern social and humanitarian knowledge is studied in the context of various theoretical and methodological paradigms: structural and functional (system) [1, 2], institutional [3], neo-institutional [4, 5], spatial-territorial [6, 7], network [8], socio-cultural [9, 10], reproductive [11], synergetic [9], etc. Close attention to regional systems is caused by the global trend towards local autonomy amid globalization processes. Thus, there is growing relevance of studying not only the region as a system with properties typical for all systems, but also the specific feature of this system due to the rootedness of actions of subjects in a certain socio-cultural space.

The performance of social processes, their risks accompanied by specialization of subsystems, their increasing interdependence, requires the development of not only forms of adaptation of regional systems to the challenges of our time, but also flexible, dynamic mechanisms for their modernization based on preventive impact. Accordingly, the application of new methods and approaches to understanding the modernization of territories is updated, which is especially important in Russia amid the regions' existing conditions taking into account their various development level.

It is also necessary to take into account that a social system amid instability is unbalanced, the value of random, individual factors increases. Accordingly, there is a need to study insignificant (from the point of view of historical process) but large-scale (from the point of view of richness of social life, uncertainty of forecasts) periods, as well as the micro-social level of the modernization process, resources of network informal practices and their demand when implementing modernization of specific areas.

Theoretical and methodological framework

In our opinion, an interdisciplinary approach is promising when studying the regional system which faces the issue of finding resources for effective responses to the challenges of our time. The purpose of the study is to analyze the modernization process in the region using theoretical and methodological capabilities of the system approach, the concepts of heterarchy and modernization. This will enable to identify the region's development stage, identify resources and problem areas of the region's modernization.

As for the theory of heterarchy, its main provisions are developed by D. Stark. Heterarchy

is referred to as a special way of arranging social space characterized by intensified social relations, their growing complexity, internal diversity and organizational reflexivity, and interdependence of elements of social systems in a dynamic social life in the modern era [12, 13]. The application of conceptual ideas put forward by D. Stark proved to be productive for modern social and humanitarian knowledge. For example, in philology, the concept "heterarchy" is used in the study of models of spontaneous monologues of narrative and reasoning where heterarchy is assumed "at the level of voicing internal speech, putting a thought into a word, which ultimately forms a strong hierarchy at the macro-structural level, i.e. at the level of a completed text" [14, p. 264]. In psychology, the analysis of self-reflection in the structure of consciousness substantiates the thesis that "self-reflection is a basic procedural tool of consciousness arranged based on the principle of heterarchy" [15, p. 6]. Interdisciplinary studies of integration of an individual amid variability of modern society development through the concept of heterarchy lead to a conclusion about the cross-functional diachrony in the socialization process, which is caused by contradictions of "internal "institutional" formations of an individual..., intra- and inter-system relations of subordination (hierarchy) and coordination (heterarchy)" [16, p. 104].

Historians are developing a heterarchical model of political genesis, which was formed among primitive peoples based on "military democracy" (in particular, among East Slavs – based on long-term preservation of equalitarian traits) [17]. The application of conceptual provisions of the theory of heterarchy made it possible to draw a fundamental conclusion about the plurality of ways of social evolution, whose ideas originate from ideas of K. Marx about the Asian mode of production and the two paths of statehood development. The first way of evolution – hierarchical – is based upon the vertical of power and centralization and is characterized by concentration of wealth among the elite, the existence of networks of dependence and patronage, a reflection of social differentiation in funeral rituals, control of the elite over trade of items of conspicuous consumption, development of crafts for the requirements of the authorities, and the presence of cults of leaders, their ancestors, the reflection of statuses and hierarchy in an ideological system and architecture. The second – heterarchical way – is characterized by wiser distribution of wealth and power, more moderate accumulation, segmental social structure, economic efforts of the society aimed at solving collective goals (food production, construction of fortification, temples, etc.), universalizing cosmology, religious worship and rites. The architecture emphasizes a standardized way of life" [18, p. 19]. In our opinion, the features of hierarchical and heterarchical relations highlighted by historians in the analysis of paths of statehood development are applicable in the study of the modern era.

In economics, in order to develop a methodological framework for modeling the interaction and development of territorial socio-economic systems it is required to hold economic analysis of organizational forms having the characteristics of a heterarchy, in particular, the existing dense networks of "intertwined property rights that permeate industries and sectors of the economy, extend over their borders, affecting mostly enterprises and banks most" [19, p. 91].

It is noteworthy that the provisions of theories of heterarchy and network analysis (in particular, in line with the latter – the idea of M. Granovetter about the strength of weak ties in the society [20]) are conceptually close. The use of such theories is especially productive in the sociological analysis of phenomena and processes as they are aimed at addressing issues about methods of relations between elements of social systems,

in particular, "the interaction of the micro-level with the structures of the macro-level" [20, p. 31]. A number of scholars use the concept of "heterarchy" and "network society" as synonyms in the study of economic activities ("network economy") [21], virtual organizations [22, p. 80], and management methods [23]. It is noted that the focus on mutually beneficial cooperation, lack of hierarchy or its reduced importance, the formation of the structure of "horizontal relations" are the characteristics of both social networks [24] and heterarchies. Other researchers insist on fundamental differences between network and heterarchical approaches. For example, N.N. Kradin, analyzing the strategies of political genesis uses the terms "hierarchical" and "network" as synonyms, identifying the heterarchical path with the cooperative one [18, p. 19]. According to I.V. Krasavin, the ratio of the concepts of "hierarchy", "network", and "heterarchy" is more complex. "In the process of differentiation, hierarchies multiply; networks are a tool for multiplying arranged structures; together they form a heterarchy, which is a "complete" model of community relations as a multiple whole" [25, p. 36].

We should recall that the term "heterarchy" was first used in 1945, at the dawn of the computer age, by W. McCulloch in the analysis of neural networks [13, p. 79]. This is probably why the theory of heterarchy is used in the study of new media, Internet communications as a system-forming element of a fundamentally new system of public relations based on rejection of spatial integration, inability to produce one-way object-subject models, poor coordination, unpredictability, uncontrollability [26, pp. 53-54; 27, pp. 6, 9]. Although it should be noted that foreign researchers are exploring the reverse process – from heterarchy (non-linear, flexible, open, auto-poetic, unarranged networks; short-term projects: for example, fashionable web-design; staff change, part-time job) to hierarchy ("direct corporate work"; long-term prospects of relations with customers; professional advice) [28] based on one of the companies of new media industry in London, which may be, in our opinion, a reflection of the process of Internet communications becoming institutional.

As for the modernization theory, we have already turned to the analysis of its theoretical provisions [29, 30]. The application of provisions of the heterarchy and modernization concepts to analysis of regional processes is very productive since there is an intersection of the subject fields of the concepts of "heterarchy", "region", and "modernization": heterarchy is referred to as a form of organization [13], management and political decision-making [31, p. 43; 32]; modernization – as a controlled process consciously initiated by the authorities [29, 30, 33], and hierarchy and manageability are the characteristics of a region as a self-organizing system along with territoriality and the ability to integrate/disintegrate [34, 35]. Thus, a common objective in identifying the nature of the concepts "heterarchy", "region" and "modernization" is to address the issues about the nature, principles (values) of management in the situation of ""sewing" the background knowledge of ontological uncertainty and non-equilibrium basic compositions of social life pushing the society towards chaos and uncontrollability"[36, p. 27].

In the framework of the theory of heter-archy there is still no developed conceptual model of management. According to D. Stark, heterarchy as a new way of organization lies between two poles – market, based on the relations of independence, and hierarchical based on the relations of dependence, while heterarchies are dominated by the relations of interdependence, the minimum degree of hierarchy and organizational heterogeneity [12].

There is also a point of view, according to which heterarchy and hierarchy are opposed as two extreme points of control over systems on the axis of "self-organization-organization" [31, p. 43; 37, p. 13; 38, pp. 262-263]. But a number of researchers dispute the use of the concept of heterarchy as the main antonym for hierarchy [39]. Hierarchy and anarchy as principles of ordering are polar; heterarchies exist between these poles within fluid relations between the state and the society [40]. E.E. Bocharova, noting the opposing nature of many characteristics of hierarchy and heterarchy, emphasizes that these categories are not mutually exclusive. "Heterarchy is often defined as "a multiple hierarchy", as a set of differentiated but interdependent levels in a unified system, each with their own principles, mechanisms of organization... All these levels are significant, but may not always be functionally equal; however, the overall multidimensionality of the heterarchy is supported by the complexity of each level" [16, p. 106]. The researcher draws attention to the fact that hierarchies are dominated by management (super-ordination) and subordination relations, while in heterarchies – coordination relations [16, p. 106]. According to V.A. Osipov, heterarchy can be studies in terms of "interaction and interpenetration of hierarchical and network structures, horizontal and vertical processes ... which leads to a sharp increase in socially useful activity, emergence of new meanings of resources" [32, p. 40]. A similar point of view is expressed by I.V. Pavlyutkin. The nature of heterarchy, in his opinion, lies in symbiosis of two forms of organizations – several formal organizations (hierarchical structures acting according to formal rules and procedures) and networks of spontaneous communication. As a result of this symbiosis, humanitarian entrepreneurial activity emerges [41, pp. 47-48].

There is also a view that heterarchy is opposed to the state as a kind of complex political monopoly, while heterarchy is a condition for legitimization of this monopoly [42]. In this regard, ideas that state can initiate the simulation hierarchy [42] creating pseudo-hierarchy are being developed [32, p. 41]. In our opinion, these ideas are reflected in terms of the concepts of the Lefiathan state standing against social structures. But there is also an idea of a state as a central "joint" of the heterarchy responsible for meta-management [43]. Such an idea is akin to an ideal model of management presented by Lao Tzu, a Chinese philosopher, founder of taoism, who thought that the best ruler is one that people simply know they exist [44]. Within the framework of the theory of heterarchy, such ideas are conceptualized in the idea that self-organization processes should be understood as the transfer of control to autonomous frequent organizations, and "control implies only creating conditions for the emergence of heterarchical systems. Setting goals for autonomous parts is a specific way to create such conditions" [31, pp. 46-47]. Ideally, the state is able not only to simulate, but also to create a heterarchy, creating conditions for their emergence. Moreover, "facing complex challenges, the highest governance level can increase chances of survival of the entire system, not only limiting freedom, but sometimes, on the contrary, expanding the diversity of lower levels, encouraging creativity and thus facilitating self-organizing trends. It is freedom of lower levels that reliably absorbs the variety of situations in a proactive and aggressive environment that leads to creative solutions to difficult problems..." [37, p. 15].

As for the system approach, heterarchy can be considered in the context of complex systems as a type of dynamic heterarchy (along with a complete dominant and incomplete dominant hierarchies and holarchy). "A complex system whose structure is defined as a heterarchy is described by a luid situational network [45, p. 47]. The principle of heterarchy is necessary for fixing the fact "that none of them performs a permanent leading role in the development of structural

subdivisions of the social whole...” [36, p. 27]. Ideas about multiple centers of development and strengthening of internal diversity and organizational reflexivity in the theory of heterarchy also intersect with ideas about regionalism as a characteristic of a multipolar model of the world order and the postulates of neo-modernist concepts of multicultural modernization about the possibility of transition from traditional society to modern industrial one taking into account civilizational features [46, 47]. Based on this we can conclude that any civilizational specific characteristics with an appropriate organizational design and structure can become an important modernization resource. The creation of such design and such structures is a managerial objective. There is a growing importance of competent goal setting and solution of such problems in heterarchical systems. “In the network-centric model of management the system error is reduced with the improvement of the quality of management decisions (compared to the hierarchical organization). With the deteriorating quality of management decisions the error a network-centric system is increased (compared to the hierarchical organization). ... Network-centric management techniques have the greatest positive effect in industries with a high quality of management decisions” [23, p. 26].

The study of a region as a heterarchical system also clarifies procedural issues, namely, at what development stage the system is located, what ties – horizontal (self – organization) or vertical (organization) – currently prevail. As noted by D.M. Bondarenko, social systems can change their internal organization, developing towards heterarchy or hierarchy, which is determined by the political culture and the relations between people. “As a rule, heterarchical relations and institutions are more developed in societies with direct interpersonal relations are highly valued or at least not less valuable than the depersonalized and formalized relations...” [48].

As a result, it is necessary to develop situational management models, whose implementation will provide maximum development effect with minimal resources. The researchers have already identified the advantages and disadvantages of implementing heterarchical and hierarchical models depending on certain conditions and challenges of the environment. The advantages of heterarchies are: their adaptability due to their flexible structure subject to rapid adjustment; autonomy of economic elements of the system, which “helps minimize lost profit due to the most complete implementation of environmental conditions” [38, pp. 262-263]; capacity for self-organization, that is, a solution to specific problems under unstable conditions with a rapidly increasing complexity [31, pp. 43-44]; predominant motivation “based on belief, turning people into a team of co-thinkers by bringing together their models of reality, goals, points of view, vision of problems”; creating opportunities for decision-making for the one closest to the problem; promoting initiative, effective use of human resources, creating conditions for training future leaders, using the potential of capable people [37, p. 13, 16].

The advantages of hierarchical systems include the ability to “minimize costs through effective resource allocation by strictly formalized activities” [38, pp. 262-263]; efficient solution to “sustainably developing issues with a predictable complexity level that helps adjust the pace of decision-making from a single centre...” [31, p. 44]”; simplified control reducing the likelihood of errors due to the inexperience of performers; excluded possibility of “parasitism”; creation of conditions for using the experience and knowledge of senior management; relative predictability; efficient use of various resources, except human [38, p. 16]. “The emphasis on hierarchical structure is justified in stabilized conditions without tough competition and under monopoly functioning” [38, p. 15].

Materials and methods

The hierarchical principles of organization are necessary for the socio-cultural space of our country to preserve integrity. Russia also has its differentiated vast space characterized by potential "bottom up" heterarchical self-organization. Here we can also use the term "holon". "Holon, being a whole, is also a part of another whole. For example, our federal state has a holonic structure. Each holon (separately taken people, family, industrial and public associations of people, municipal unit, constituent entity) is sufficiently autonomous; however, when solving common objectives holons interact among themselves, relying on the existing regulatory legal acts or effectively concluding direct agreements. Each holon in a holonic system is a kind of a "building block"... Management processes in holonic systems are based on heterarchical and hierarchic principles... in holonic systems, the flexibility of a heterarchy is combined with the stability of a hierarchy" [49, p. 42].

The image of a region as a building block emphasizes the role of a separate region in preserving the unity of the architectural structure of the Russian state. The Astrakhan Oblast (as a building block) occupies a strategically important geopolitical position in the South of Russia and the Caspian Sea, lies at the intersection of major trade routes. Its socio-cultural space has historically developed at the intersection of East and West and is characterized by heterogeneity and multiculturalism, which is manifested both in economic life (gas industry, fish, vegetables, melons...) and in marginal consciousness value, due to the historically formed multi-confessional and multi-ethnic culture and enhanced by the scale of modern migration flows. The mentality of Astrakhan people is prevailed by a rural type with lower social claims, and collectivist attitudes [for more details see 29].

To study the modernization processes in the region we use analysis of statistics, performance of human development indices (HDI) and modernization indices (calculation method proposed by the Chinese Academy of Sciences [33]), as well as the results of the sociological monitoring study supervised by E.V. Kargapolova in the Astrakhan Oblast using the method of interviews at the place of residence according to the Standard Methodology of the all-Russian research program "Socio-cultural evolution of Russia and its regions" (heads and tools developers at the federal level: N.I. Lapin, L.A. Belyaev, Center for Socio-Cultural Change, Institute of Philosophy, Russian Academy of Sciences (CISI IF RAN) [50]. The first stage was held in January 2010 (N=1000), the second – in May–June 2012 (N=600), the third – in April–May 2016 (N=1000). The sampling is stratified, quota-route. Quota controls are: "sex", "age", "type of settlement", "ethnic structure". Sampling error – 3%. Data processing and analysis was performed using SPSS 17.0. The matrix was developed by experts of the Center for Socio-Cultural Change at Institute of Philosophy of the Russian Academy of Sciences.

The tools of the standard methodology include interview questions devoted to various aspects of the region's life. In this article, we analyze the answers of Astrakhan residents to the questions that help get an idea of the complex relations ("interweaving") of hierarchic and heterarchical relations, the degree to which the hierarchical organizatio-nal structure and informal practices of the population agree, the elements of the social system, which can be used as a modernization resource; as well as the problems that stand in the way of this process.

We also conducted a comparative analysis of performance of indices of modernization, human development and the performance of results of sociological monitoring study obtained in the Astrakhan Oblast. The monitoring results in the region are compared with results of surveys in other Russian regions where

the study was conducted using a similar method. This helps increase the reliability of results.

Research results

Consider the modernization processes in the Astrakhan Oblast at the macro-level of the country's hierarchical structure – in the socio-cultural space of the Southern Federal District (FD). According to modernization indices, in 2011 the Astrakhan Oblast managed to overcome the system lag and enter the "middle" stage of primary modernization [29, 51][1]. This qualitative change in the region is reflected in HDI performance: since 1999, all constituent entities of the Southern FD, as well as Russia as a whole, significantly increased their HDI and its components, but only the Astrakhan Oblast managed to improve its position in the ranking of Russia's constituent entities: it moved up 20 positions – from 41 in 1999 to 19 in 2013[2].

The results of the second wave of socio-logical monitoring study in the Astrakhan Oblast on the all-Russian research program "Socio-cultural evolution of Russia and its regions" (in 2012): compared with the results of the first wave (2010), the integrating value core strengthened – (in 2010 the integrating value core of Astrakhan residents included two values – human life and family, in 2012 there already are six of them – human life, family, communication, order, well-being, and tradition)[3]. These results indicate the growing support for basic values by the residents of Astrakhan in this period of time. A similar trend is observed in the results of the all-Russian monitoring "Values and interests of the Russian population" [52, p. 20], as well as in the Chuvash Republic and the Vologda Oblast [53, p. 68; 54, p. 67-69; 55, p. 78]. Moreover, non-market motivation of labor activity decreased slightly (from 57.4% to 53.4%) *(see Tab. 1)*, a decrease in protest potential was observed, etc. (from 45.2% to 35.1%) *(see Tab. 2)* [for more details, see, for example, 29].

After 2013 the indicators of primary (industrial) modernization in the Astrakhan Oblast begin to decline as well as in all regions of the Southern Federal District *(see Figure)*. In the Republic of Adygea in 2015 the situation changed even by stage: the region returns to the stage at which it had been until 2011 – "traditional, preliminary" from the stage "below medium". The Astrakhan Oblast managed to maintain its position on the classification of modernization stages. Although HDI in the region increased in 2014, the Astrakhan Oblast was two places down among Russia's constituent entities – from the 21st to the 23rd – due to the reduced GRP per capita and life expectancy[4].

[1] Source: IAS "Modernization". Available at: http://mod.vscc.ac.ru (accessed: 03.05.2017).

[2] Source: UN Development Programme. Human Development Reports (HDI) in Russia. Available at: http://www.undp.ru (accessed: 03.03.2017).

[3] The value system of the population of the Astrakhan Oblast is studied based on the method of studying the value structure developed by N.I. Lapin. The purpose of the method is to identify value clusters guiding the behavior of individuals and other social actors in terms of main functions of the society in Russia and its regions as socio-cultural integrities. During the analysis, fourteen values were divided into two clusters: integrating and differentiating. Integration is referred to as the main function of basic values. In turn, the function of differentiation based on a smaller part of basic values is to preserve and change the structure of statuses and roles. The division of values into clusters and layers is arranged basis of the compliance of weighted average assessment of a particular value to the corresponding point interval (interval limits are established through the research methodology). Within each cluster there are two hierarchical layers. The components of the integrating cluster are the integrating core (over 4.4 points) and the integrating backup (3.91–4.39 points), the differentiating cluster is represented by the opposing differential (3–3.9 points) and the conflict-generating periphery (2.99 points or less). The integrating core consists of fundamental values. The layer of the integrating backup includes second-order values (stock). The opposing differential includes values that many people refuse to accept as their own guidelines. The conflict-generating periphery includes values denied by the majority of people [50].

[4] UN Development Programme. Human Development Reports (HDI) in Russia. Available at: http://www.undp.ru (accessed: 03.03.2017).

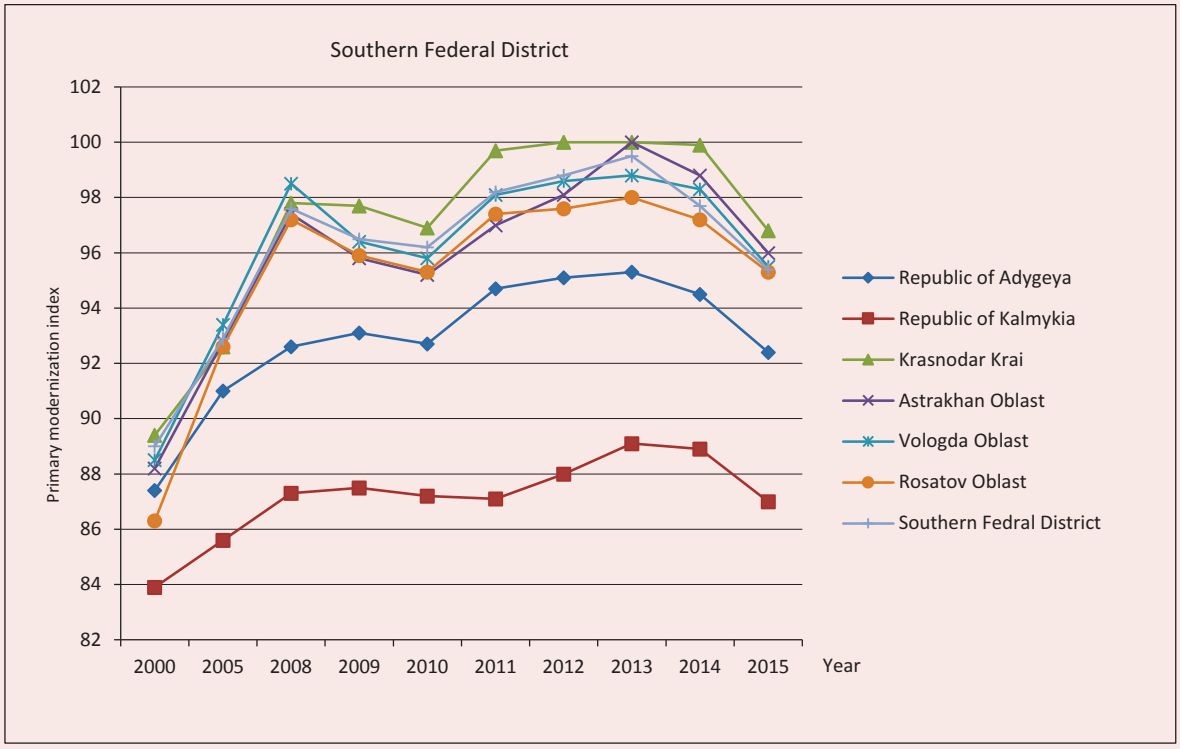
Table 1. Answers to question "What kind of job would you prefer today if you could choose?" among Astrakhan residents (% of respondents)

Variant	2010	2012	2016
With medium yet stable income and confidence in the future	47.4	41.9	43.5
With medium yet stable income	10.0	11.5	13.0
With medium yet stable income with more free time or easier job	5.4	6.2	9.1
With high income even if there is no guarantee for the future	14.6	12.4	18.2
Own business despite all risks	12.5	15.0	11.7
Undecided	5.3	5.3	1.8
No answer	4.8	7.7	2.7
TOTAL	100	100	100

Table 2. Answers to question "Are you ready to take part in protests (against declining standard of living and quality of life, violation of human rights and freedoms)?" among Astrakhan residents (% of respondents)

Variant	2010	2012	2016
I am ready	23.8	16.1	18.2
I think I am ready	21.4	19.0	25.8
I think I am not ready	15.8	21.5	21.9
I am not ready	26.0	27.7	26.2
Undecided	10.5	12.4	4.6
No answer	2.5	3.3	3.4
TOTAL	100	100	100

Figure 1. Chart: primary modernization trends in the Southern Federal District



Source: IAS "Modernization". Available at: http://mod.vscc.ac.ru (accessed: 03.05.2017).

Consider how the decline in modernization and human development indicators was manifested in the state of the Astrakhan Oblast as a socio-cultural system in 2015–2016 in line with perceptions about the institutional, intellectual, and geographical heterarchy [56, pp. 233-241].

As for ***the institutional heterarchy***, according to V.S. Martianov, its nature in the modern society lies in complication and simulation of institutions [56]. It is noteworthy that within the institutional and regulatory sphere of the region in the past decade a strengthening of the vertical of power,

that is, hierarchical relations, has occurred. This is reflected in statistical indicators of number and share of government employees among total workforce. In 2015, 16,145 people were employed in government bodies and local self-government in the Astrakhan Oblast. Since 2000, the number of employees in public administration has increased, being in 2014, compared to 2013, already more than 40%. This is, just like in other regions, due to the increased share of officials working in territorial executive bodies, that is, in government entities at the regional level whose activities are regulated by presidential decrees and government resolutions. By 2015, the number of officials in the region working in these entities amounted to 8,882 people, which is about half of total bureaucracy in the region. The volume of this social group reached its maximum value in 2014 (9,214 people), which was almost three times more than in 1995[4].

According to the results of the third wave of sociological monitoring study in 2016, an increase in institutional trust was recorded in the region. Compared with the results of the second wave of the monitoring study (2012), trust in the Prosecutor's office increased by 20.3%, in the Legislative Assembly, the region's Duma – by 13.9%, the police – by 17%, the government – by 12.2%, trade unions – by 11.6%, municipal and local governments – by 11.2 %, the Governor – by 10.6 %, the court – by 9.7 %, regional offices of political parties – by 9.5 %, and the media – by 5 %. All social institutions (except the media) exceeded the levels of 2010.

But, despite the strengthening of the vertical of power and the growing institutional trust, in 2016 only one out of five Astrakhan residents (20.4%) felt completely safe when walking alone in their neighborhood after dark, about half of the respondents (44.3%) – relatively safety; about one out of four respondents (23.6%) said it was not safe; every tenth resident of the region (9.8%) – "not safe at all". Every fifth Astrakhan resident gave an affirmative answer to the question "Have you or your family members been victims of robbery, assault, or violence over the past five years?". The level of protest potential in 2016 returned to the level of 2010 (see Tab. 2).

A clear demonstration of the institutional heterarchy in the socio-economic sphere (namely, the simulation of institutions of market economy) is the predominance of non-market labor motivation among the population of the region and fluctuations in labor motivation – from market to non-market, which depend on both market and political situation (see Tab. 1). Institutional heterarchy is also manifested in the distribution of employees in enterprises by ownership. Thus, for the entire research period, about 40% of the region's residents are employed by government institutions. Also, according to the survey, the share of employees in enterprises of various forms of private ownership is reduced: in 2010 it was about 35%, in 2012 – about 30%, in 2016 – about 23 % (see *Tab. 3*). According to the survey results, since 2010 the share of employees at joint-stock enterprises with state participation, private enterprises, collective farms, state farms, agricultural cooperatives as their primary employment has reduced. In 2012, the maximum number of self-employed was recorded, but in 2016 this share returned to the level of 2010. In 2010 about one in every ten people (10.8%) was engaged in side job, in 2012 – one in every 12–13th (7.9 %), in 2016 – every 5–6th (18.9 %). A large share of "side jobs" (4.4%) in 2016 accounts for state-funded institutions – schools, hospitals.

The motivation of employment in enter-prises by form of ownership also varies from wave to wave. Thus, in 2010, about 40% of Astrakhan residents wanted to work at private enterprises,

[4] *Russian regions. Socio-economic indicators, 2009: statistical book*. Rosstat. Moscow, 2009. Available at: http://www.gks.ru/bgd/regl/b09_14p (accessed: 13.02.2016); *Russian regions. Socio-economic indicators, 2016: statistical book*. Rosstat. Moscow, 2016. Available at: http://www.gks.ru/bgd/regl/b16_14p (accessed: 13.02.2018).

Table 3. Answers to the question "What is the type of enterprise (institution) you currently work as your main employment?" (% of respondents)

Variant	2010	2012	2016
State or local government bodies	n/a	n/a	13.6
State-funded organization or institution (e.g. school, clinic, etc.)	n/a	n/a	13.3
State, municipal enterprise	41.9	38.9	11.1
Joint-stock company with state participation	10.2	6.5	4.3
Joint-stock company without state participation	3.4	5.4	3.3
Personally owned company	1.9	2.7	2.4
Private enterprise (not owned)	14.0	7.5	10.3
Collective farm, state farm, agricultural cooperative	3.9	1.4	0.4
Farming enterprise	0.9	0.8	0.4
Private subsidiary farm	1.1	0.1	0.7
Self-employment	2.0	7.3	2.5
Other	1.7	0.4	0.7
I have no permanent job	6.5	6.9	0
Undecided	0.8	1.7	0.9
No answer	11.0	11.0	2.9

which was approximately equal to the desire to be employed in state-owned enterprises and institutions. The majority of people among those who want to work in private enterprises in 2010 would prefer to work at personally owned enterprises (15.9 %). In 2012, the share of those wishing to work in the private sector increased compared to 2010 by 9.8% and amounted to 47.9%, which exceeded the share of those willing to work at state-owned enterprises as their primary employment by 12.8%. In 2012, most people in Astrakhan would like to work at their own private enterprises and engage in self-employment. In 2016, the share of Astrakhan residents who would prefer to work at private sector enterprises not only decreased to the level of 2010, but also became much lower than the share of those wishing to work at public sector enterprises (37.9% against 51.5%).

Intellectual heterarchy is a kind of a reaction to a monopoly of the state's system of values; it is a sensitive indicator of "divergence of legal and legitimate, real and possible in the existing social organization" [56, p. 241]. D. Stark stresses that "heterarchies are organizations with multiple ideological positions" [12, p. 124], "complex adaptive systems, where many principles of performance assessment intertwine. They are heterarchies of values" [13, p. 77].

Intellectual heterarchies in the structure of the background knowledge of Astrakhan citizens are manifested in the growing socio-cultural distances, which is manifested, first of all, in a significantly decreased support of almost all basic values while maintaining their hierarchy: in 2012 the average support score of all values comprised 3.99 points, in 2016 – 3.56 points on a five-point scale, which is significant in this rather short time range and can not be explained by the usual statistical error in the framework of our methodology for the study of the value system: the decreased support was so significant that all values were located in clusters of the integrating reserve, the opposing differential and the conflict-generating periphery, while there were no values in the integrating core. It is noteworthy that a significant decrease in support for basic values in the same period was recorded by the results of the all-Russian monitoring "Values and interests of the Russian population" [52, p. 20] and the results of a survey in the Vladimir Oblast [57]. Moreover, another manifestation of intellectual

heterarchy is recorded in the results of monitoring the growing share of those Astrakhan citizens who rarely visit cultural institutions (in 2016, already about half of them), but one in every three people begins to visit them more often. We cannot but rejoice that the latter group consists of young people predominantly.

Primary social networks are strengthening along with the increasing marginality of the value consciousness of Astrakhan citizens. Thus, the importance of family values in the structure of primary social networks increased by 10% from 2010 to 2016: in 2010, answering the question: "Among which people do you have maximum mutual understanding?", 71.9% of respondents chose "family", in 2016 – 81%. The importance of friends increased by 2.9 times (from 18% in 2010 to 52.3% in 2016). The importance of colleagues and neighbors increased significantly; this trend was already evident in 2012 (from 5.8 % to 16.7% and 4.3% to 13.5% respectively).

Intellectual hierarchies are manifested in the population's disregard for the deteriorating objective indicators of the environment in the region and the growing positive estimates of air (from 21.5% in 2010 to 28.1% in 2016) and water purity (from 20.6% to 32.7% in the same period). Although during the same period in the region there was the most significant dynamics of reduced use of fresh water among the entities of the Southern Federal District – from 2335 million m^3 to 794 million m^3, that is, 2.9 times, and the level of pollutants atmospheric emissions in 2016 continues to exceed the level of 1990[5].

We believe that this indicates a decreased level of social claims in terms of solving the priority problems of surviving with minimum planning horizon, on the one hand. On the other hand, it is a demonstration of behavior of consumers whose economic interests prevail over all others (for more detail see [58]). The lowering level of social claims is also seen in the increased self-assessments of people's own health. The share of Astrakhan residents who assess their condition as fine increased from the first to the third wave from 28.3 to 40.3%; the share of respondents who "sometimes fall sick", on the contrary, decreased from 43.7 to 37.6 %. Although people's dissatisfaction with the current health system is growing at the same time, which demonstrates its dysfunction as a social institution. According to the monitoring results in 2010 and 2012, the number of people satisfied with medical care amounted to about 15 %, in 2016 – this number reduced by half and comprised only 7.2%.

Geographical heterarchy is manifested in the distancing of alternative sources of power and norms in geographic space or in a milder form – inducement to emigration [56, p. 233]. Geographical heterarchy is manifested in the socio-cultural space of the region primarily in the growing emigration request. The share of Astrakhan residents who want to leave the region increased from 4.6% in 2010 to 8.2% in 2016; the share of those who want to leave Russia increased from 1.8% to 3% in the same period. The share of those who are happy to live in the Astrakhan Oblast, on the contrary, decreased from 29.6% to 19.9 %. The number of respondents who do not have any feelings for the region also increased (from 9.8 to 16.1%).

The potential of geographical heterarchy in the region is enhanced by the fact that the Astrakhan Oblast is a historically formed crossroads of migration flows [59]. In recent decades a migration influx of young working population from the republics of the North Caucasus and Central Asia is recorded [29]. Such an influx in a multi-ethnic and multi-religious region leads to increased ethnic tensions recorded in the monitoring results (see [29] for more detail). The adaptation of young migrants with

[5] *Russian regions. Socio-economic indicators, 2010.* Available at: http://www.gks.ru/bgd/regl/b10-14p/Main.htm (accessed: 28.09.2017); *Russian regions. Socio-economic indicators, 2017.* Available at: http://www.gks.ru/bgd/regl/b17_14p/Main.htm (accessed: 28.09.2017).

predominantly low professional qualifications is the objective of the region's system of education, whose potential, according to the ranking, is growing. Thus, according to the calculations of the Vologda Research Center of RAS, during 1990–2010 the region improved its status among Russia's constituent entities in terms of consolidated index of science and education development and moved up from 67 to 37th place [60, p. 179-180].

Analysis and explanation of research results

Thus, the analysis of modernization processes in the region based on the system approach, concepts of modernization and heterarchy has led to the following conclusions.

1. The application of the theory of heterarchy in various paradigms of modern social and humanitarian scientific knowledge – philology, psychology, sociology, economics, history, political science, network, system, etc. – indicates its significant theoretical and methodological potential. At the same time, interdisciplinary analysis reveals a number of contradictions in the application of conceptual approaches of this theory, which is expressed in different (sometimes opposite in meaning) interpretations of the connection of the concept of "heterarchy" with other concepts, and various interpretations of the influence of heterarchies on social processes.

2. The following items are promising for the analysis of modernization processes in the region in theoretical and applied aspects:

– research conclusion that subject fields of the concepts of "heterarchy", "region", and "modernization" overlap in terms of addressing the nature, principles (values) of management, as well as vectors of modernization of regional systems based on multipolarity, internal diversity, and regional specific features;

– the image of a region as a complex social system based on hierarchical (stability) and heterarchical (flexibility) relations that are not mutually exclusive. Such a system can be upgraded by changing its internal organization towards a heterarchy or a hierarchy. This emphasizes the importance of competent goal making and solution of management tasks, development of situational management models whose implementation will provide maximum development effect with minimal resources. The specific features of system development with appropriate organizational design and structure can become the most important modernization resource;

– conceptual provisions on the Leviathan state opposing public heterarchical entities and the state as a central joint of a heterarchy engaged in meta-administration.

3. The socio-cultural space of the Astrakhan Oblast can be represented as a system the evolution of which consists of four states: growth and accumulation, adaptation, accumu-lation of changes, and transformation [61]. The current state of the system can be called turbulent, unstable due to change of stages of its state. The state of the region's system can be currently identified as a stage of accumulation of changes or reorganization, which means that the system is close to transformation, that is, the a transition to a new qualitative and stable state, in our case, by simplifying the system. The simplification of the system is manifested in lower level of social claims among part of the region's population along with strengthened value of primary social networks and reduced support for basic values. This process is amplified by the geographical heterarchy, which is manifested in the complex process of migration substitution of social groups with higher social demands by the carriers of nomadic mentality with low social claims. The carriers of this type of consciousness are stable; they have lower level of social claims, but reduced social capital manifested in the quality education and high-level professional competence. This strengthens the economic mindset to simple survival. Moreover, they have developed their own understanding of

basic values. Paradoxically, the simplification of the system with an appropriate organizational design and structure can become the region's modernization resource. The sensitive area of modernization is the complex nature and simulation of socio-economic institutions, which shows the dysfunction of the life-supporting sphere of the region's socio-cultural space.

Thus, based on interdisciplinary synthesis of the system approach, concepts of modernization and heterarchy, analysis of statistical information, performance of modernization and human development indices, we analyze the results of the sociological monitoring study, modernization processes in a particular Russian region, identified the development stage of the regional system, and the resources and problems of modernization in the region in terms of a complex "overlap" of hierarchy and heterarchy relations. The obtained results can be applied in daily management of the regional society in a difficult and unstable transition period.

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Problems of the European North of Russia and the Possibilities of Its Participation in the Development of the Arctic Zone of the Russian Federation*

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Abstract. The challenges that Russia has to face due to the unstable geopolitical situation in the world make it necessary to search for internal sources of development and enhance the efficiency of territorial management. Under the circumstances, in our opinion, the priority object of state policy should be the Northern and Arctic territories, which have a huge natural resource and economic and geopolitical potential. At the same time, their development in the post-Soviet period has accumulated a set of issues that require understanding and development of mechanisms to address them, which is the goal of the present paper. The analysis has shown that the market reforms of the 1990s carried out in the European North of Russia and in its Arctic zone led to increased depopulation, degradation and primitivization of industrial production, curtailment of agricultural production, decline in the quality of life, growth of concentration of economic and social activity in the "nodal" points and degradation of the potential of peripheral municipalities. On the basis of a comprehensive analysis of socio-economic development and strategic planning documents of the European Union, we have found out that these territories have objective prerequisites for the diversification of production on the basis of deep processing of raw materials, broad cooperation and interregional integration. We prove that the interregional integration of

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the territories of the European Union and its Arctic zone with the more southern regions of the country will facilitate the formation and development of long technological chains in priority sectors (oil refining, forestry, civil and science-intensive engineering, etc.) that go beyond the Arctic zone of the Russian Federation. At the same time, we prove that the Vologda Oblast can play an important role as an outpost for the development of the Arctic. We propose priority tools for development of transport and logistics system in the region; this will eliminate the infrastructure constraints of economic growth and ensure the integration of the European part of the Arctic zone of Russia into the single economic space of the country. Further directions of research on this issue will be a detailed substantiation of the proposed mechanisms of interregional integration of the territories of the European North and its Arctic zone.

Key words: European North of Russia, Arctic zone of the Russian Federation, socio-economic development, territorial-economic system, technological chains, transport system, strategy.

Introduction. Russia, the largest country in the world, is characterized by huge interregional differences in natural resources, ethno-social, structural, historical, climatic conditions and development factors; that is why it needs to take into account spatial aspects. In this regard, we agree with Academician A.I. Tatarkin who noted that "the optimal use of economic space has always determined and will determine the political, national, demographic, social and economic identity of the Russian state" [1]. Along with this Academician P.A. Minakir and Doctor of Sciences (Geography) A.N. Demyanenko pointed out that "the economic space of modern Russia is a unique phenomenon, beyond any doubt. And it is not only that it is extensive and diverse, but also that for at least the last two decades it has been subjected to radical transformations" [2].

At the same time, a complex and extremely painful tangle of problems, challenges and threats has formed in the spatial development of modern Russia. There are even foreign studies where an attempt is made to estimate the annual losses of the Russian Federation due to inefficient spatial organization of the country[1]. It is obvious that finding solutions to them requires public administration using the tools of regional, structural and investment, innovation, social, and environmental policy.

An important role in the development of the country, of course, should be played by the regions of the North and the Arctic[2] of Russia, which have a huge geostrategic and natural resource potential. At the same time, the potential of these territories is currently not used to the fullest extent due to the violation of the main economic ties between the regions of the country in the post-Soviet period, the deterioration of the quality of human capital, and the destruction of infrastructure[3]. These negative processes lead not only to the compression and defragmentation of the economic space of the country, but they are also factors that cause an increase in threats to its national security [3, 5].

[1] In particular, according to the Brookings Institution (Washington, D.C., USA), they are estimated at 2.3–3.0% of GDP [3].

[2] The world community has not clearly established the boundaries of the Arctic yet. Usually they are the Arctic circle –66°33' (Canada – 60°, Norway – 65°), while the July isotherm for these territories is 10° C (USA). In Russia, the boundaries of this macroregion were approved by the decree of the President of the Russian Federation "On land territories of the Arctic zone of the Russian Federation" (dated May 2, 2014 No. 296)

[3] Thus, the share of inter-regional turnover in Russia's GDP decreased from 25 to 16% in a relatively short period (1990–1994) [4]. After that the restoration of economic ties within Russia was extremely slow.

The European North of Russia (Arkhangelsk, Vologda, Murmansk oblasts, Komi and Karelia republics, and Nenets Autonomous Okrug) is one of the key and largest (1,466 thousand sq.km) regions of the European part of the country; the region has a favorable economic and geographical location (in the North it is washed by the Barents and White seas; in the West it borders on Finland and Norway; thus it has huge opportunities for the development of foreign trade; in the East and South – on the economically developed Urals and Central Russia, respectively).

The leading branches of specialization of the European North are the forest industry complex, ferrous and nonferrous metallurgy, chemical industry, fuel and energy complex; all of them are based on the rich mineral resource base of the region. Part of its territory belongs to the Arctic Zone of the Russian Federation (AZRF) and is characterized by very severe climatic conditions.

We share the viewpoint of V.N. Lazhentsev, RAS Corresponding Member, who suggests that the development of interregional economic integration along the line of "North–South" and the integration of the region into the economic space of the country will provide an effectively use of the resources of the European North and will help find a solution to strategic issues of development of the Arctic Zone of Russia as a whole [6]. At the same time, effective management of these processes, in our opinion, requires a comprehensive study of the features and systemic problems of development of the territories of the European North of Russia, as well as substantiation of effective mechanisms for their participation in the implementation of the strategy for development of the Arctic Zone of the Russian Federation. This is the *goal* of our present work.

To achieve this goal it is necessary to consider the following *tasks*:

1) analyze trends and identify key problems in the socio-economic development of the territories of the European North of Russia;

2) identify long-term guidelines and features (contained in the strategic documents of regional development) of the "Arctic vector" in the development of the subjects of the European North of Russia;

3) identify promising areas and substantiate the mechanisms for the participation of the European North of Russia in the strategy for development of the Arctic Zone of the Russian Federation.

Theoretical aspects of the research. Domestic economic and geographical science has significant research experience in the analysis of the processes of development and management of the Northern and Arctic territories and in the role of these territories in the spatial development of the country.

In general, the majority of research on spatial issues started during the Soviet era. In particular, the following scientists carried out the research on theoretical substantiation of trends and regularities in the placement of productive forces in the Soviet Union: *G.M. Krzhizhanovsky*[4] (considered the national economy as an integral system, the key element of which is electrification; he laid the foundations for the creation of energy-industrial complexes; he justified the need for electrical supply of industrial areas from large district power plants), *I.G. Aleksandrov*[5]

[4] See, for example: Krzhizhanovsky G. *The Main Tasks of Electrification of Russia.* Kharkov: Vseukrainskoe gosudarstvennoe izdatel'stvo, 1920. 60 p.; Krzhizhanovsky G. *Economic Problems of the RSFSR and* the Work of the State General planning Commission (Gosplan). Moscow, 1922. 126 p.

[5] Aleksandrov I.G. *Economic Zoning of Russia.* Gosplan. Moscow, 1921. 15 p.; Aleksandrov I.G. *Fundamentals of Economic Zoning of the USSR. M*oscow; Leningrad: Ekonomicheskaya zhizn', 1924. 75 p.

(together with G.M. Krzhizhanovsky, he carried out research on economic zoning of the territory of the USSR), developed scientific foundations of the concept of power and production cycles and territorial production complexes that were further developed by N.N. Kolosovsky), *V.M. Chetyrkin*[6] (studied the problems of economic zoning – the idea of a nodal economic problem), *N.N. Nekrasov*[7] (developed the principles of formation and development of national economic and territorial-industrial complexes, acted as the scientific supervisor of complex research on the development of general schemes of development and placement of productive forces of the USSR for the future), *A.E. Probst*[8] (created the scheme of zoning for the fuel and energy complex of the country, developed the idea of the so-called "concenters"), *V.S. Nemchinov*[9] (comprehensively studied the construction of industrial, coal-metallurgical bases and hydroelectric power plants in the upper Yenisei and in the Amur basin, considering them as the centers of future large general economic complexes), *S.V. Slavin*[10] (substantiated the inextricable link between the development of the North and the economic development of the entire USSR; actively proposed to move to a single socio-economic management of the region), *A.G. Granberg*[11] (studied the national economy as a system of regions interacting in a market environment with state regulation; elaborated regional development programs – in Siberia, the Far East, the North, as well as major regional transport projects), *A.G. Aganbegyan*[12] (made a significant contribution to the development of the first scientifically substantiated concept of the state and prospects of the productive forces of Siberia and the Far East and the works on optimal planning for the development and placement of industries).

Since the 1960s with the direct participation of the academic community, a pre-planned (forecast) document was developed – the General Scheme for development and placement of the productive forces of the USSR. The last General Scheme was developed for the period up to 2005, and the last Comprehensive Program – up to 2010. In the 1970s–1980s, major regional programs were developed (West Siberian oil and gas complex, economic development of the Baikal–Amur Mainline zone), programs for the formation of territorial production complexes focused on the use of rich natural resources (Timan-Pechora, Pavlodar-Ekibastuz, groups of complexes of the Angara-Yenisei region, etc.) [7]. However, unfortunately, many valuable research findings have not been used in practice.

[6] Chetyrkin V.M. *Central Asia: (an Experience of a Complex Geographical Description and Zoning)*. Moscow; Leningrad: Vneshtorgizdat, 1958. 207 p.; Chetyrkin V.M. *Problematic Issues of Economic Zoning*. Tashkent: Fan, 1967. 123 p.

[7] Nekrasov N.N. *Scientific Problems of the General Scheme of Placement of the Productive Forces of the USSR: Theses of the Report at the General Meeting of the Academy of Sciences of the USSR*. Moscow, 1966. 7 p.; *The Economy of the USSR – an Interconnected Economic Complex*. Moscow: Znanie, 1973. 64 p.

[8] Probst A.E. *The Main Problems of Geographical Location of the Fuel Economy of the USSR*. Moscow; Leningrad: Izd-vo Akad. nauk SSSR, 1939. 404 p.

[9] Nemchinov V.S. Theoretical issues of rational distribution of productive forces. *Voprosy ekonomiki,* 1961, no. 6; Nemchinov V.S. *Statistical and economic issues of balance of national economy*. In: Scientific Notes on Statistics. Izd-vo AN SSSR, 1957. Vol. 3.

[10] Slavin S.V., Dogaev Yu.M. Development of the productive forces of the North and problems of regional scientific-technological progress. *Problemy Severa*, 1972, no. 17, pp. 5-20.

[11] *Optimization of Territorial Proportions of the National Economy*. Moscow: Ekonomika, 1973. 248 p.

[12] Aganbegyan A.G., Granberg A.G. *Economic and Mathematical Analysis of Input-Output Tables for the USSR*. Moscow: Mysl', 1968. 357 p.; Granberg A.G., Aganbegyan A.G., Bagrinovsky K.A. *The System of Models of National Economic Planning*. Moscow, 1972. 351 p.

It should be noted that many classical works on Northern studies are currently in demand from the point of view of the formation of the concept of redevelopment of the Arctic (V.V. Ivanter, V.N. Leksin, A.N. Shvetsov, B.N. Porfiriev, A.N. Pilyasov) and the formation of new approaches to the assessment of Northern and Arctic natural resource potential (T.E. Dmitrieva, M.A. Zhukov, V.A. Kryukov, V.N. Lazhentsev, V.G. Loginov, V.S. Selin, S.A. Suspitsin).

A number of European countries are actively conducting research on the development of the Arctic. In particular, research institutions and universities in Denmark (Arctic Research Centre at Aarhus University, Arctic Technology Centre at the Technical University of Denmark), Iceland (University of Iceland, Reykjavik University), Norway (Research Council of Norway, Norwegian National Committee for Polar Research), Finland (Arctic and Antarctic Research Committee of the Council of Finnish Academies, Universities of Lapland, Aalto, Oulu, Turku and Helsinki), Sweden (Swedish Research Council, Swedish Polar Research Secretariat) conduct a set of applied and fundamental studies on the effective use of minerals, water, biological, and tourist and recreational resources; organization of nature protection, biodiversity conservation, organization of environmental monitoring; sustainable development, climate change, study of coastal zones, etc. Scientists from North America deal with similar issues [8–12].

The Northern and Arctic problems in our country are in the focus of attention not only of the scientific community, but also of the state. Back in the Soviet period, a number of legal acts and policy documents on the development of these territories were adopted *(Tab. 1)*.

Table 1. Strategic and program documents for the development of the North and the Arctic in Russia

Period	Strategic and program documents for the development of the North and the Arctic
USSR (1920–1989)	1. GOELRO Plan (electrification plan, adopted by the Council of People's Commissars on December 21, 1921). 2. Joint resolution of the Council of People's Commissars of the USSR and the Central Committee of the CPSU (b) "On the measures for the development of the Northern Sea Route and the Northern economy" (adopted July 20, 1934). 3. The list of regions of the Far North and areas equated to the regions of the Far North, which are subject to the decrees of the Presidium of the Supreme Soviet of the USSR of February 10, 1960. 4. About the adoption of the Regulations on the Commission on Arctic and Antarctic Affairs at the Cabinet of Ministers of the USSR and the Personal Structure of this Commission (Resolution 308 of the Cabinet of Ministers of the USSR dated May 29, 1991).
Russian Federation (1990 – present)	1. Interdepartmental Commission for Arctic and Antarctic Affairs, which replaced the State Commission for Arctic and Antarctic Affairs of the RSFSR (established in 1992). 2. The program for development of hydrocarbon reserves on the shelf of the Arctic seas of Russia, calculated until 2010 (approved in 1996). 3. Federal Law No. 78 "On the fundamentals of state regulation of socio-economic development of the North of the Russian Federation" dated June 19, 1996 (expired in 2005). 4. The concept for state support for the economic and social development of the regions of the North (approved by Government Resolution No. 198 dated March 7, 2000). 5. Fundamentals of the state policy of the Russian Federation in the Arctic for the period up to 2020 and beyond (approved by the Order of the President of the Russian Federation of September 18, 2008 No. 1969). 6. The strategy for the development of the Arctic Zone of the Russian Federation and national security for the period up to 2020 (approved by the President of the Russian Federation on February 8, 2013).); 7. State program "Socio-economic development of the Arctic Zone of the Russian Federation" (approved by the Resolution of the Government of the Russian Federation No. 366 dated April 21, 2014); 8. Draft Law "On the development of the Arctic Zone of the Russian Federation" (not yet adopted). 9. Draft Strategy for spatial development of the Russian Federation for the period up to 2025.
Source: own compilation.	

At the same time, we should note that at present there is no legal act that comprehensively regulates socio-economic development in the Northern regions of Russia. There used to be such a law: Federal Law "On the fundamentals of state regulation of socio-economic development of the North of the Russian Federation" of June 19, 1996 No. 78, which enshrined such principles of governance as state protectionism and selectivity. However, it became invalid in 2005.

The priority directions of the state policy in relation to the Northern regions, enshrined in the Concept of state support for the economic and social development of the regions of the North (approved by RF Government Resolution of March 7, 2000 No. 198), included balanced development of production, preservation of the environment and the traditional way of life of the indigenous peoples of the North. However, many of its provisions, unfortunately, have not been implemented in practice.

For the first time, the Arctic Zone of the Russian Federation was defined as an object of complex state management in 1989 by the decision of the State Commission at the Council of Ministers of the USSR for Arctic Affairs. However, in the 1990s, the Arctic territories were on the periphery of state interests. A new round of development of the Arctic topic dates back to the mid-2000s. Thus, the Foundations of the state policy of the Russian Federation in the Arctic for the period up to 2020 and beyond were adopted in 2008 (approved by the Order of the President of the Russian Federation No. 1969).

Land borders of the Arctic Zone of the Russian Federation were legally determined by the Decree of the President of the Russian Federation "On land territories of the Arctic Zone of the Russian Federation" dated May 2, 2014 No. 296. Along with this, in 2013, the Strategy for the development of the Arctic Zone of the Russian Federation and provision of national security for the period up to 2020 was approved. The state program "Socio-economic development of the Arctic Zone of the Russian Federation" was approved by the RF Government Resolution No. 366 of April 21, 2014 (as amended by the RF Government Resolution No. 1064 of August 31, 2017) was approved. The Strategy for spatial development of the Russian Federation for the period up to 2025, designed by the Ministry of Economic Development of the Russian Federation, names the Arctic Zone of the Russian Federation as one of the geostrategic territories of the country.

The most important role of these territories has been repeatedly pointed out in the speeches of top state officials. Thus, Russian President Vladimir Putin at the plenary session of the 4th international Arctic forum The Arctic: Territory of Dialogue, held on March 29–30, 2017 in Arkhangelsk, noted that "...the importance of the Arctic has increased manifold... We aim to ensure its sustainable development, create a modern infrastructure, develop natural resources, strengthen the industrial potential, improve the quality of life for the indigenous Northern people"[13].

What is the Arctic Zone of the Russian Federation at present? In that part of the land Arctic Zone, the composition of which is established by the Decree of the President of the Russian Federation, it is the most developed and populated (in it the population in 2016 amounted to 2.5 million people; in the American Arctic – 0.8 million people, in the Arctic Europe – 1.3 million people). The total area of the Arctic territories of Russia is about three million km^2 (18% of the territory of the Russian Federation), including 2.2 million km^2 of land *(Fig. 1)*.

[13] Transcript of the plenary session of the 4th international Arctic forum The Arctic: Territory of Dialogue. Available at: http://szfo.gov.ru/press/events/1061/

Figure 1. Borders of the Arctic Zone of Russia (in accordance with the Decree of the President of the Russian Federation "On land territories of the Arctic zone of the Russian Federation" No. 296 dated May 2, 2014)

Arctic Zone of the Russian Federation

1 – Murmansk Oblast

2 – Republic of Karelia (Loukhsky, Kemsky and Belomorsky municipal districts)

3 – Arkhangelsk Oblast (Onezhsky, Primorsky and Mezensky municipal districts, urban districts of Arkhangelsk, Severodvinsk and Novodvinsk, and also those Arctic islands that are under its jurisdiction)

4 – Nenets Autonomous Okrug

5 – Yamalo-Nenets Autonomous Okrug

6 – Krasnoyarsk Krai (Taimyrsky (Dolgano-Nenetsky) Municipal District, Urban District of Norilsk, Municipal Entity the Town of Igarka in Turukhansky Municipal District)

7 – Republic of Sakha (Yakutia) (Abyisky, Allaikhovsky, Anabarsky, Bulunsky, Verkhoyansky, Zhigansky, Oleneksky, Nizhnekolymsky, Srednekolymsky, Ust-Yansky and Eveno-Bytantaisky uluses)

8 –Chukotka Autonomous Okrug

9 – Republic of Komi (Urban District of Vorkuta)

Border of the European North of Russia

At the same time, this macroregion has a huge natural resource potential [13]. Thus, according to the estimates of the scientists[14], the Arctic contains significant reserves of gold (40% of national Russian amount), oil (60%), gas (60–90%), chromium and manganese (90%), platinum metals (47%), and diamonds (100%); the total cost of mineral resources of the Arctic subsoil exceeds 30 trillion US dollars[15]. The share of the Arctic Zone in the volume of production produced by mining and processing industries is 1/5 and 2%, respectively.

Research methods. To achieve this goal, we used the methods of economic, statistical and comparative analysis, generalization, and monographic method. The methodological basis of the study consists of the works of domestic and foreign economists in the field of regional and spatial economy, state and municipal administration, scientists engaged in research on the problems of the North and the Arctic.

The main research findings. The market post-Soviet transformations of the 1990s had a negative impact on the socio-economic development of the territories of the European

[14] Comprehensive scientific and technological program for research, development, creation of products and services for 2018–2025 "Scientific and technological directions of increasing the efficiency of development and use of the Arctic". Available at: http://minec.gov-murman.ru/documents/20-gogoberidze-g.g..pdf

[15] Natural resources of the Arctic. *RIA Novosti*, April 15, 2010. Available at: https://ria.ru/arctic_spravka/20100415/220120223.html

North of Russia [4, 14, 15]. One of the key problems of the European Union, like most other regions of the country, is the reduction of the permanent population *(Tab. 2)*.

Thus, the population of the Murmansk Oblast in 1990–2017 decreased by 26.7%, the population of the Komi Republic – by 22.2%. Depopulation was the lowest in the Vologda Oblast. This is due, among other things, to the outflow of the population from the more Northern territories of the country to this subject. Population decline was even faster in rural areas: during the same period, the number of rural residents in the Murmansk Oblast decreased by almost half, in the Arkhangelsk Oblast – by 38%, etc.

Along with natural population decline, there are processes of its migration outflow, which causes a reduction in the number of inhabitants of these territories. All this leads to the "extinction" of entire settlements, deterioration of management of these territories, and decrease in the connectivity of space.

Negative processes are also observed in material production. In particular, in the field of industry during the last two decades there have been the processes of de-industrialization, which was reflected in the decreasing share of manufacturing industries in GRP (in the Murmansk Oblast during the period under consideration it decreased by 17 percentage points, in the Vologda Oblast – by 9 p.p.).

At the same time, manufacturing activities are significantly inferior to mining activities, occupying a very modest share in the gross regional product; moreover, there exist significant territorial differences. Thus, in 2016, the gross value added in manufacturing in the Vologda Oblast was 37.6% in the GRP of the region, while in the Murmansk Oblast it was only 9.2% (with the average Russian level of 17.3%, *Tab. 3*).

However, the goods produced in the European North of Russia are not innovative. Thus, the share of high-tech and science-intensive industries in the GRP of the Republic of Komi in 2016 was only 12%, in the Republic of Karelia – 16.6%, in the Vologda Oblast – 16.7% (national average value is 20.7%), and the indicator showed a declining trend in all regions over the past 10 years *(Tab. 4)*. It should be noted that according to this indicator, the

Table 2. Population in the subjects of the European North of Russia (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		
Resident population													
Republic of Karelia	792	729	698	643	640	637	634	633	630	627	622	85.3	78.5
Republic of Komi	1240	1043	985	899	890	881	872	864	856	851	841	80.6	**67.8**
Arkhangelsk Oblast (including Nenets Autonomous Okrug)	1569	1369	1291	1225	1214	1202	1192	1183	1174	1166	1155	84.4	73.6
Vologda Oblast	1354	1290	1235	1201	1199	1196	1193	1191	1187	1183	1177	91.2	86.9
Murmansk Oblast	1189	923	864	794	788	780	771	766	762	758	753	81.6	**63.3**
Rural population													
Republic of Karelia	144	186	171	141	138	135	132	129	127	124	122	65.6	84.7
Republic of Komi	297	258	240	207	203	200	196	193	189	187	184	71.3	**62.0**
Arkhangelsk Oblast	411	343	349	297	289	282	280	27	265	259	254	74.1	**61.8**
Vologda Oblast	462	403	393	350	356	343	339	335	333	329	325	80.6	70.3
Murmansk Oblast	100	71	74	57	57	57	56,6	57	57	57	58	81.7	**58.0**

Source*:* calculated using the data from the official website of the Unified Interdepartmental Information and Statistical System (EMISS). Available at: www.fedstat.ru

Table 3. Share of gross value added created in manufacturing industries, in the GRP of constituent entities of Russia, %*

Territory	2000	2005	2008	2010	2015	2016	2016 to 2000, +/-
Russian Federation	19.3	18.5	19.3	17.7	17.4	17.3	-2.0
Republic of Karelia	18.1	17.6	15.8	17.5	13.4	17.9	-0.2
Republic of Komi	12.1	11.7	11.0	9.7	11.7	11.7	-0.4
Arkhangelsk Obast (including Nenets Autonomous Okrug)**	19.2	18.9	17.0	12.4	13.1	14.0	-5.2
Vologda Oblast	46.9	46.6	50.5	38.1	34.9	37.6	-9.3
Murmansk Oblast	26.1	25.5	15.8	17.5	12.5	9.2	-16.9

* GRP broken down by type of economic activities for 2017 has not been officially published yet (as of February 1, 2009).
** The data are presented for the Arkhangelsk Oblast together with Nenets Autonomous Okrug, because in the statistics for the considered indicator the Arkhangelsk Oblast is presented separately only since 2010. In 2016, this figure was 0.3% for NAO.
Source*:* calculated using the data from the official website of the Unified Interdepartmental Information and Statistical System (EMISS). Available at: www.fedstat.ru.

Table 4. The share of high-tech and knowledge-intensive industries in the gross regional product of constituent entities of the Russian Federation, %

Territory	2005	2010	2012	2015	2016	2016 to 2005, p.p.
Russian Federation	20.1	19.1	19.4	19.3	20.7	0.6
Republic of Karelia	18.4	17.4	18	18.3	16.6	-1.8
Republic of Komi	13.2	10.3	10.7	13.1	12.0	-1.2
Arkhangelsk Oblast (including Nenets Autonomous Okrug)	18.8	16.9	16.9	18.9	17.6	-1.2
Vologda Oblast	22.8	22.6	21.1	20.3	16.7	-6.1
Murmansk Oblast	18.3	17.1	18.6	19.1	16.9	-1.4
Kaliningrad Oblast	22.6	22.4	23	26.4	23.0	0.4
Leningrad Oblast	14.3	13.7	12.2	13.5	15.2	0.9
Novgorod Oblast	27.7	27.9	30.1	29.3	28.3	0.6
Pskov Oblast	24.1	23.1	23.2	21	19.4	-4.7
Saint Petersburg	28.8	29.6	30.9	31.7	29.8	1.0

Source*:* calculated using the data from the official website of the Unified Interdepartmental Information and Statistical System (EMISS). Available at: www.fedstat.ru

subjects of the European North of Russia are very significantly inferior to other regions of the Northwestern Federal District (for example, the Kaliningrad Oblast and Saint Petersburg), which indicates some primitivization of the economy of the Northern and Arctic territories and the predominance of production of low-value added products in them.

Crisis phenomena are also observed in agriculture in the regions of the European North of Russia. However, despite the decline in agricultural production in 1991–2017, some regions (Vologda Oblast) have retained significant development potential, the implementation of which can solve the problems of food supply in the European part of the Arctic[16].

Disturbed processes of reproduction of fixed capital in key sectors of the economy in the regions of the European North of Russia lead to an increase in the level of depreciation of fixed assets of organizations. Thus, in the Republic of Karelia, the figure was 53%, in the Vologda Oblast – 50.5% (national average level is 50.9%). And in all constituent entities except the Arkhangelsk Oblast, depreciation increased by 1–12 p.p. in 2000–2017 *(Tab. 5)*.

[16] Currently, agriculture in the Arctic specializes mainly in animal husbandry (reindeer husbandry).

Table 5. Depreciation of fixed assets,%

Territory	2000	2005	2010	2011	2012	2014	2015	2016	2017	2017 to 2000, p.p.
Russian Federation	43.5	44.1	45.7	46.3	45.9	47.9	48.8	50.2	50.9	+7.4
Republic of Karelia	40.7	26.0	35.2	37.9	41.5	44.0	47.2	49.6	52.8	+12.1
Republic of Komi	37.6	49.4	54.6	55.3	44.2	45.1	46.0	45.0	47.1	+9.5
Arkhangelsk Oblast (with Nenets Autonomous Okrug)*	51.1.	44.0	36.1	42.8	42.7	45.1	46.8	45.3	48.1	-3.0
Nenets Autonomous Okrug	39.8	38.3	26.1	31.1	33.0	42.1	44.3	43.3	45.6	+5.8
Vologda Oblast	42.2	50.1	46.1	40.9	40.9	45.9	48.7	51.6	50.5	+8.3
Murmansk Oblast	41.8	42.9	42.7	42.8	37.0	38.9	41.9	52.2	43.1	+1.3

* The data are given for the Arkhangelsk Oblast together with NAO, as in the statistics on the considered indicator the Arkhangelsk Oblast is presented separately only since 2013.
Source: *Russian Regions. Socio-Economic Indicators. 2018: Statistics Collection.* Rosstat. Moscow, 2018. 1162 p.

Table 6. Population with incomes below the subsistence level, %

Territory	2000	2005	2008	2010	2011	2012	2014	2015	2016	2017	2017 to 2000
Russian Federation	29.0	17.8	13.4	12.5	12.7	10.7	11.2	13.3	13.3	13.2	-15.8
Republic of Karelia	22.3	15.9	15.6	14.9	15.7	13.6	14.2	16.4	17.3	17.3	-5.0
Republic of Komi	26.3	14.9	15.1	15.6	16.4	13.5	14.3	14.6	16.3	16.8	-9.5
Arkhangelsk Oblast (without Nenets Autonomous Okrug)*	33.5	17.5	14.4	14	14.4	12.9	14.1	15.8	14.7	13.5	-20.0
Nenets Autonomous Okrug	37.9	9.0	5.6	7.5	7.7	6.6	9.0	9.7	10.5	11.4	-26.5
Vologda Oblast	25.5	18.3	15.7	16.8	17.1	13.3	12.9	14.2	13.4	13.6	-11.9
Murmansk Oblast	24.9	19.1	13.8	13.2	13.6	11.3	10.9	12.7	12.8	12.6	-12.3

Source: *Russian Regions. Socio-Economic Indicators. 2018: Statistics Collection.* Rosstat. Moscow, 2018. 1162 p.

Table 7. Cargo transportation by railway, million tons

Territory	1990	2000	2005	2010	2015	2017	2017 to 2000, %	2017 to 1990, %
Russian Federation	2140.1	1046.8	1273.3	1312.0	1329.0	1384.3	132.2	64.7
Republic of Karelia	25.5	14.7	18.7	20.2	27.3	27.6	187.8	108.2
Republic of Komi	55.7	24.9	22.6	20.7	18.3	13.7	55.0	24.6
Arkhangelsk Oblast (with Nenets Autonomous Okrug)*	23.0	9.0	16.0	11.8	10.4	11.1	123.3	48.3
Vologda Oblast	30.7	15.5	17.6	17.6	18.4	20.4	131.6	66.4
Murmansk Oblast	47.2	24.6	27.0	28.2	26.3	29.1	118.3	61.7

Source: *Russian Regions. Socio-Economic Indicators. 2018: Statistics Collection.* Rosstat. Moscow, 2018. 1162 p.

Negative processes in the economy and in the labor market, as well as unfavorable conditions in the North, causing a rise in the cost of living, led to the fact that in the subjects under consideration, despite the positive trend of the last seventeen years, the share of the population with incomes below the subsistence minimum in 2017 was still higher than the national average (13.2%): in the Republic of Karelia – 17.3%, in the Republic of Komi – 16.8%, in the Vologda Oblast – 13.6%, in the Arkhangelsk Oblast – 13.5% *(Tab. 6)*.

Reduction in the volume of cargo turnover of the main modes of transport (primarily railway, *Tab. 7*) in the post-Soviet period (1990–2017) is one of the key indicators that characterize the decline in economic activity in these territories.

At the same time, there is a certain tendency toward the reduction in the proportion of hard surface roads in the total length of public roads (with the exception of the Republic of Komi). These circumstances bring to the fore the problem of ensuring transport connectivity of space and developing logistics in the territory of the European North of Russia.

Thus, the results of the analysis show that there is a whole range of system-wide problems of socio-economic development in the subjects of the European North of Russia. At the same time, objective differences in the prerequisites for and potential of development of these territories further enhance their heterogeneity in both economic and managerial aspects. This heterogeneity is particularly acute at the intraregional level. Hence, there is a need to identify areas with similar development features in order to implement specific methods and tools of their state support.

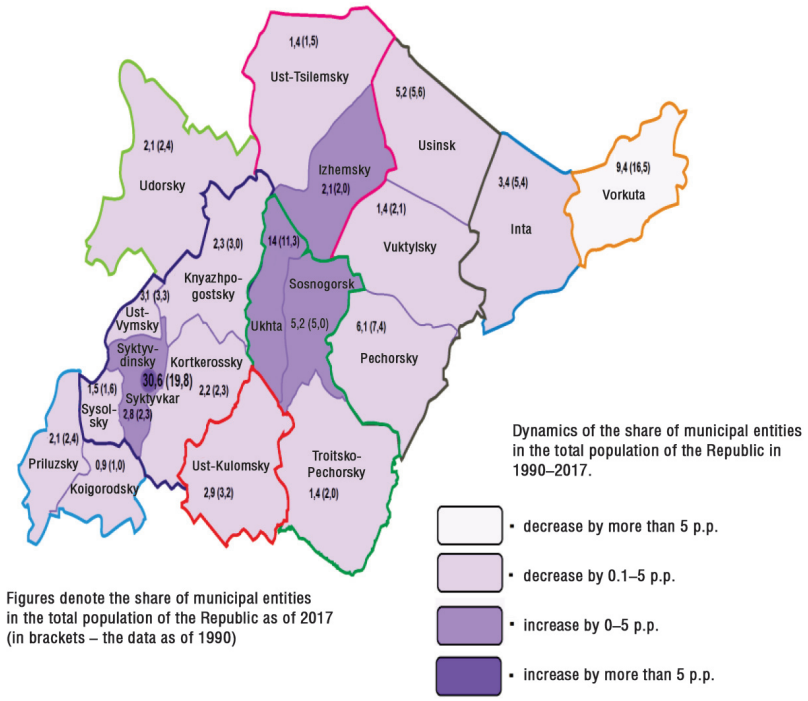
One of the leading scientists engaged in economic and geographical zoning and the study of the processes of transformation of space at the intraregional level, was Doctor of Sciences (Geography) E.E. Leizerovich. In the study of these issues, he used the concept of "economic microdistrict" (EM), which meant intra-republican, intra-krai and intra-oblast communities, which include, as a rule, several rural administrative districts, as well as, most often, one or more cities of extra-district subordination. These territories have a fairly distinctive economic image, and their residents outside the city-center of EM are characterized by a relative unity of lifestyle and quality of life [16, 17]. E.E. Leizerovich allocated 35 economic microdistricts on the territory of the European North of Russia. The following EM are within the administrative borders of the Vologda Oblast and the Republic of Komi *(Tab. 8)*.

The main trend in the development of microdistricts of the European North is the concentration of population and economic activity in the "nodal" points and the increase in the area of the periphery. Thus, the analysis of demographic processes in the intra-republican areas of Komi shows that in 1990–2017 there was a concentration of population near the

Table 8. Economic districts within the Vologda Oblast and the Republic of Komi (according to the classification of E.E. Leizerovich, 2010)

RF constituent entity	Economic microdistricts
Vologda Oblast	1. Vologodsky (city of Vologda, town of Sokol, Vologodsky, Ust-Cubinsky, Sokolsky, Mezhdurechensky, Gryazovetsky, Vozhegodsky, Kharovsky districts). 2. Velikoustyugsky (town of Veliky Ustyug, Nyuksensky, Velikoustyug, Kichmengsko-Gorodetsky, Nikolsky, Tarnogsky districts). 3. Totemsky (Totemsky, Babushkinsky districts). 4. Verkhovazhsky (Syamzhensky, Verkhovazhsky districts). 5. Kirillovo-Belozersky (Vashkinsky, Kirillovsky, Belozersky districts). 6. Vytegorsky (Vytegorsky district). 7. Cherepovetsky (city of Cherepovets, Cherepovetsky, Babaevsky, Kaduysky, Ustyuzhensky, Chagodoshchensky, Sheksninsky districts).
Republic of Komi	1. Syktyvkarsky (city of Syktyvkar, Sysolsky, Kortkerossky, Ust-Vymsky, Syktyvdinsky, Knyazhpogostsky districts). 2. Pechorsky (towns of Pechora, Usinsk, Vuktyl). 3. Udorsky (Udorsky district). 4. Ust-Tsilemsky (Ust-Tsilemsky, Izhemsky districts). 5. Intinsky (town of Inta). 6. Vorkutinsky (town of Vorkuta). 7. Ukhtinsky (towns of Ukhta, Sosnogorsk (Triotsko-Pechorsky district). 8. Southwestern Komi (Priluzsky, Koygorodsky districts). 9. Ust-Kulomsky (Ust-Kulomsky district).

Figure 2. The share of municipalities in the total population of the Republic of Komi and the dynamics of the change in its share in 1990–2017



Municipal entity	Share, %		2017 to 1990, p.p.*
	1990	2017	
Syktyvkar	19.8	30.6	+10.8
Ukhta	11.3	14.0	+2.7
Syktydvinsky	2.3	2.8	+0.5
Sosnogorsk	5.0	5.2	+0.2
Izhemsky	2.0	2.1	+0.1
Sysolsky	1.6	1.5	-0.1
Ust-Tsilemsky	1.5	1.4	-0.1
Kortkerossky	2.3	2.2	-0.1
Koygorodsky	1.0	0.9	-0.1
Ust-Vymsky	3.3	3.1	-0.2
Priluzsky	2.4	2.1	-0.3
Udorsky	2.4	2.1	-0.3
Ust-Kulomsky	3.2	2.9	-0.3
Usinsk	5.6	5.2	-0.4
Troitsko-Pechorsky	2.0	1.4	-0.6
Knyazhpogostsky	3.0	2.3	-0.7
Vuktyl	2.	1.4	-0.7
Pechora	7.4	6.1	-1.3
Inta	5.4	3.4	-2.0
Vorkuta	6.5	9.4	-7.1

* The data are arranged according to the rate of change in the indicator in 2017–1990.
Source: Komistat.

administrative center of the Republic (the development of Syktyvkar agglomeration: the share of Syktyvkar in the total population of the constituent entity increased from 19.8 to 30.6%; similar trends are observed in the Syktydvinsky District); within the Ukhta agglomeration (the share of Ukhta increased from 11.3 to 14%, the share of Sosnogorsk – from 5 to 5.2%, *Fig. 2*).

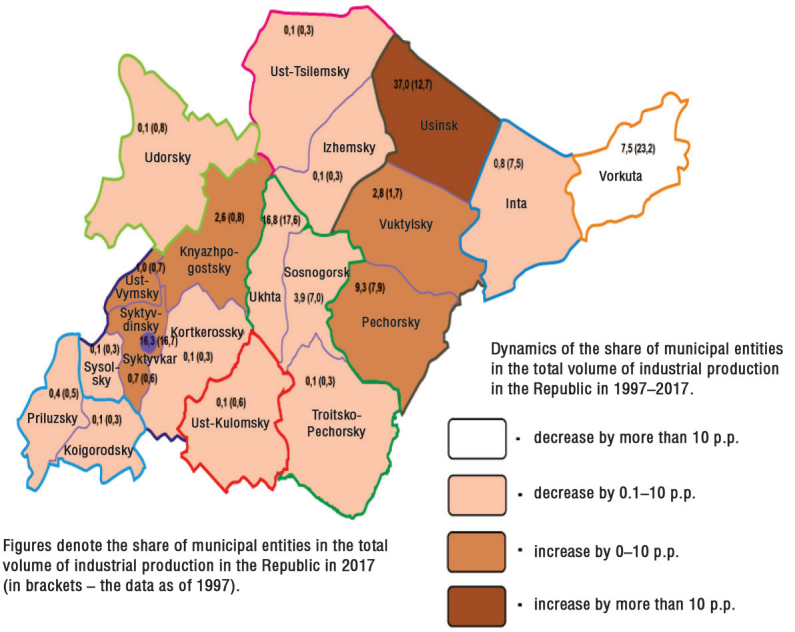
At the same time, in remote areas and in single-industry towns (for example, Vorkuta, Inta) during this period, there was a considerable population outflow due to a decrease in economic activity or shutdown of city-forming industries (primarily coal mining) and resettlement (regulated and natural) to other districts[17].

The main centers of industrial production of the Republic of Komi are the city of Syktyvkar, and the towns of Usinsk, Ukhta, and Pechora. At the same time, over the past twenty years, the role of Usinsk as a key industrial center has increased significantly, and now this municipality accounts for more than a third of the total industrial production (*Fig. 3*). Its main industry is the production and transportation of oil and gas (LUKOIL and Rosneft operate there, as well as the world's northernmost Yenisei Oil Refinery with a capacity of 1.3 million tons per year). At the same time, a number of single-industry towns of the Republic have significantly lost their positions due to the decline in economic activity.

Similar processes of the concentration of population and economic activity are typical for the Vologda Oblast, the southernmost

[17] *See: Development Potential of Municipalities: Content, Assessment, Management (on the Materials of the Republic of Komi).* Syktyvkar: Kominauchnyitsentr UrO RAN, 2008. P. 118.

Figure 3. The share of municipalities in the total industrial production in the Republic of Komi and the dynamics of its changes in 1997–2017



Municipal entity	Share, %		2017 to 1990, +/-**
	1997*	2017	
Usinsk	12.7	37.0	24.4
Knyazhpogostsky	0.8	2.6	1.8
Pechora	7.9	9.3	1.4
Vuktyl	1.7	2.8	1.1
Ust-Vymsky	0.7	1.0	0.3
Syktydvinsky	0.6	0.7	0.1
Priluzsky	0.5	0.4	-0.1
Ust-Tsilemsky	0.3	0.1	-0.2
Troitsko-Pechorsky	0.3	0.1	-0.2
Koygorodsky	0.3	0.0	-0.2
Izhemsky	0.3	0.0	-0.3
Kortkerossky	0.3	0.0	-0.3
Sysolsky	0.3	0.0	-0.3
Syktyvkar	16.7	16.3	-0.4
Ust-Kulomsky	0.6	0.0	-0.6
Ukhta	17.6	16.8	-0.7
Udorsky	0.8	0.1	-0.8
Sosnogorsk	7.0	3.9	-3.0
Inta	7.5	0.8	-6.7
Vorkuta	23.2	7.5	-15.7

* Data on the production of industrial products by municipalities have been publicly available since 1997.
** The data are arranged according to the rate of change in the indicator in 2017–1997.
Source: Komistat.

subject of the European North of Russia. Its main support centers are two major cities, acting as administrative (Vologda) and industrial (Cherepovets) "capitals", and their neighboring municipal districts. Thus, in 2017, 73.1% of the population of the Oblast lived in these municipalities, 93.3% of industrial and 65.1% of agricultural products were produced there; they also accounted for 67.5% of investment in fixed capital and 79% of retail trade turnover *(Tab. 9)*.

Thus, in the post-Soviet period in the territories of the European North of Russia there were the processes that led to the transformation of the existing supporting framework. This is manifested in the concentration of economic and social activity in the "nodal" points (as a rule, these are municipalities in which there are large cities, administrative centers or major production) and the degradation of the production, human and infrastructure potential of peripheral municipalities. These processes ultimately lead to the disruption of the connectivity of the economic space and the growth of its fragmentation. On the one hand, this is manifested in the promotion of agglomeration processes[18], and on the other – in the destruction of the potential of territories outside the agglomeration zone. In general, these processes cause further strengthening of the linear-nodal structure of the economy in the European North of Russia.

[18] Our calculations show the possibility of formation and sustainable development of nine agglomerations in the European North of the Russian Federation; they will be the poles of growth and will ensure the connectivity of the region's space [18].

Table 9. The share of Vologda, Cherepovets and their adjacent municipal districts in the values of the key parameters of socio-economic development of the Oblast, %

Territory	Year						2017 to 2000, p.p.
	2000	2010	2013	2014	2016	2017	
Share in the resident population at the end of the year							
City of Vologda, Vologodsky, Gryazovetsky, Sokolsky districts	35.6	37.2	37.9	38.2	38.4	38.5	2,9
City of Cherepovets, Cherepovetsky, Kaduysky, Sheksninsky districts	31.9	33.6	34.1	34.3	34.5	34.6	2,7
Share in industrial output							
City of Vologda, Vologodsky, Gryazovetsky, Sokolsky districts	10.5	13.0	16.1	22.8	18.3	18.6	-
City of Cherepovets, Cherepovetsky, Kaduysky, Sheksninsky districts	84.1	83.8	80.9	71.7	75.1	74.1	-
Share in agricultural production							
City of Vologda, Vologodsky, Gryazovetsky, Sokolsky districts	33.9	40.2	41.7	41.8	44.4	45.8	11.9
City of Cherepovets, Cherepovetsky, Kaduysky, Sheksninsky districts	21.7	24.8	22.2	22.7	21.5	19.3	-2.4
Share in fixed capital investments							
City of Vologda, Vologodsky, Gryazovetsky, Sokolsky districts	27.3	40.2	26.7	29.4	23.2	22.3	-5.0
City of Cherepovets, Cherepovetsky, Kaduysky, Sheksninsky districts	49.9	45.4	59.0	55.7	69.3	45.2	-4.7
Share in retail trade turnover							
City of Vologda, Vologodsky, Gryazovetsky, Sokolsky districts	40.7	40.9	43.4	43.4	43.0	42.7	2.0
City of Cherepovets, Cherepovetsky, Kaduysky, Sheksninsky districts	31.9	36.5	35.5	34.1	35.8	36.3	4.4
Calculated with the use of [19] and Vologdastat data.							

Interregional "North–South" integration and the use of the potential of these regions to address the strategic objectives of the development of the Arctic Zone of the Russian Federation can promote the development of constituent entities of the European North of Russia. The "Arctic" vector was consolidated in the majority of regional development strategies of the subjects of the European North of Russia up to 2025–2030 *(Tab. 10)*.

The analysis of strategic documents allows us to draw the conclusions that the "Arctic vector" of development of constituent entities of the European North of Russia till 2030 consists first of all in further development of resource sectors (production and processing of crude oil and gas, wood processing) and the effective organization of transport and logistic infrastructure to export this production to the Russian and international markets; this vector of development also implies strengthening Russia's defense capability on its Arctic borders and developing the Northern Sea Route. This generally corresponds to the priorities for the development of the Arctic identified at the federal level[19]. Strategic documents of constituent entities of the European North of the Russian Federation propose the development of civil industries (precision engineering, instrumentation, shipbuilding, etc.) on the basis of spatially distributed clusters. However, in our opinion, very little

[19] In particular, the Fundamentals of the state policy of the Russian Federation in the Arctic for the period up to 2020 and beyond (approved by the President of the Russian Federation on September 18, 2008) notes that one of the main national interests in the Arctic is "the use of the Arctic Zone of the Russian Federation as a strategic resource base of the Russian Federation, which provides solutions to the problems of socio-economic development of the country". At the same time, the aim of the state policy is "to expand the resource base of the Arctic Zone of the Russian Federation, which can largely meet the needs of Russia in hydrocarbon resources, aquatic biological resources and other types of strategic raw materials".

Table 10. Strategic directions and the "Arctic vector" of development of constituent entities of the European North of Russia till 2025–2030

RF constituent entity	Strategic directions of development
1. Arkhangelsk Oblast	I. Development of *transport and logistics infrastructure* (road network, port infrastructure and modern logistics facilities) *to provide access to natural and recreational resources*, including those located in the Arctic Zone of the Russian Federation. II. Ensuring access of enterprises to the resource base, assistance in the development of international and interregional cooperation, increasing the availability of natural resources. III. Allocation of *six main zones of the Arkhangelsk Oblast that unite areas with similar sectoral priorities (including the Arctic territories)*. The developed business and transport infrastructure *will provide the Arkhangelsk Oblast with the status of a pillar region for the implementation of large-scale projects for the development of the Arctic*.
2. Vologda Oblast	I. Long-term management of sustainable development of the territory will include: - balanced spatial planning of resource allocation; - maintaining and improving the quality of regional infrastructure; - use of natural potential and mineral resources. II. *Creating favorable conditions for the formation of production and technological sites that ensure the development of the Arctic Zone*.
3. Murmansk Oblast	Target scenario: "*Murmansk Oblast as a strategic center of the Arctic Zone of the Russian Federation*". I. Implementation of competitive advantages in the sphere of development of hydrocarbon potential of the Arctic shelf, *creation of new types of economic activities (production of liquefied natural gas, oil refining); formation of clusters (technological cluster for offshore production in the Arctic; production and transport and logistics; cluster of Northern design and traditional crafts)*. II. Increasing the role of tourism in the development of the region (Arctic tourism and the expansion of environmentally friendly tourism activities in the Arctic). IV. Creating the conditions for the *use of the potential of foreign economic and interregional relations for the development of the region* (support for non-resource exports; strengthening relations with the regions of the Arctic and neighboring countries).
4. Nenets Autonomous Okrug	Target scenario: *Nenets Autonomous Okrug as a strategically important Russian outpost in the Arctic macroregion*. I. The strategic priority are to raise the status of the Timan-Pechora oil and gas province as the main center of hydrocarbon production and to develop the transport infrastructure to provide access of raw materials to the main world markets. II. Ensuring a *favorable operational and military regime in the Arctic Zone of the Russian Federation*. III. Preserving and protecting the Arctic environment, eliminating the environmental implications of economic activity in the conditions of increasing economic activity and global climate change
5. Republic of Karelia	I. Development of *transport infrastructure* (transcontinental transport corridors, integration into international transport logistics systems). II. Increased *participation in international projects related to the development of the Arctic*. III. Ensuring balanced development of municipal economies (search for and definition of perspective points of growth for each district; expansion of the number of advanced development zones with localization of production connected by single production chains; *development and implementation of complex projects for the development of municipal districts included in the Arctic Zone of the Russian Federation, with the involvement of federal resources*).
6. Republic of Komi	I. *Formation of a support center for the development of the Russian Arctic in the Urban District of Vorkuta* (maintenance of the transport system for the export gas pipelines "Yamal – Western Europe"; implementation of major infrastructure projects providing for the integration of Vorkuta with other regions of the Arctic Zone of the Russian Federation; renewal of the economy by combining coal mining with activities for the development and maintenance of natural resources of the Arctic). II. *Development and implementation of the regional program "Socio-economic development of the Arctic zone of the Republic of Komi", a multi-project "Arctic"* (involves the creation of a key land transport corridor for the development of the Arctic Zone of the Russian Federation with the effective use of the region's potential). III. *Expansion of the Arctic Zone of the Republic of Komi, including other Arctic territories into its composition*. This will ensure the unity of the natural and economic systems not only in the Republic, but also in the neighboring Arctic regions.
Source: own compilation on the basis of analysis of strategic development documents for the subjects of the European North of Russia for the period up to 2025–2030.	

attention is paid to the rational formation of the settlement system, development of its support centers and infrastructure, creation of conditions for improving the quality of life in the territories of AZRF.

At the same time, to address these issues, the Arctic needs *qualified management and working personnel* (in the field of geological exploration, mining, shipbuilding, construction, forest complex, etc.); production of *high-tech products* for the needs of the economy of this macroregion; development and use of *construction technologies and materials* adapted for polar conditions (including wooden housing construction adapted to Arctic conditions); state support to ensure the functioning of the *Arctic transport system*, especially the Northern Sea Route (development of land transport routes leading to Arctic ports), development of *telecommunications infrastructure* (ensuring stable communication, including broadband Internet access); *full-fledged food security* of the population, *medicine, recreation and tourism facilities*[20]. The European North could actively participate in addressing these issues, because it has sufficient scientific, technological, industrial, and agricultural potential.

However, to solve these problems, it is necessary to implement a coordinated policy of federal, regional and local authorities and the business community. However, the State Commission for the Development of the Arctic, which until recently was a coordinating body in this regard, is currently in the process of transformation: its composition was updated in December 2018, and in January 2019, its powers were transferred to the Ministry of the Russian Federation for Development of the Far East. Thus, the question concerning the existence of a single administrative center and its plan of work for the medium and long term is currently open.

The activities of other federal and public structures (for example, the working group "Development of the Arctic and the Northern Sea Route" of the Expert Council under the Government of Russia, the interregional public organization "Association of Polar Explorers", the Association "Arctic Legal Center", the Arctic and Antarctic Council of the Federation Council, the Barents/Euro-Arctic Council, the Arctic Development Project Office, etc.) are mostly advisory and consultative in nature; there is no clear agreement on the plans of activities of these organizations.

In 2015, the agreement on cooperation in the implementation of the state policy of the Russian Federation in the Arctic was concluded between the supreme executive bodies of the Russian Federation subjects, whose territories are fully or partially included in the land territories of the Arctic Zone of the Russian Federation[21]. In our opinion, it is necessary to increase the practical role of this document and its integration with the documents of the federal level and the plans of specific business structures operating in the Arctic Zone of the Russian Federation.

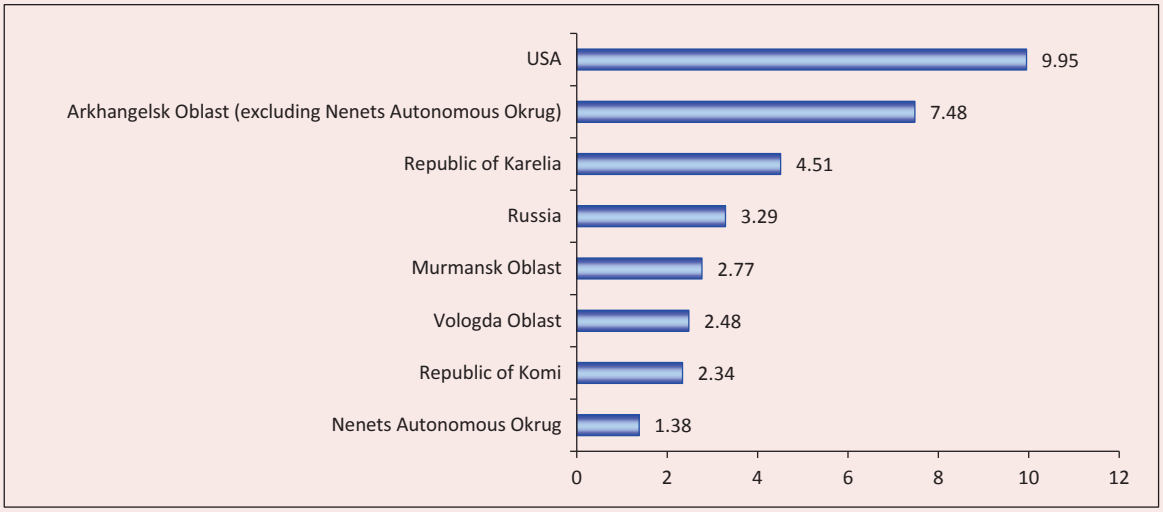
Suggestions and conclusion. Finding solutions to the identified problems of socio-economic development of the European North and its Arctic Zone requires *technological modernization of the economy in the Northern and Arctic territories*, which is currently resource-based and at a low level. This proceeds from the fact that over the past decades Russia was implementing its state economic policy, in which there was a priority of the foreign market over the domestic one.

Thus, the analysis of statistical data and studies of leading scientists shows that in recent years the share of mining in the total industrial

[20] Pilyasov A. Russian Arctic: Current State and Prospects. Available at: http://rosnord.ru/strategy/standpoint/65; Podshibyakova A. Smart North. How technology helps develop the Arctic. Available at: https://knife.media/arctic-technology/.

[21] Agreement on cooperation in the implementation of the state policy of the Russian Federation in the Arctic between the supreme executive bodies of state power of the subjects of the Russian Federation, the territories of which are fully or partially included in the land territories of the Arctic Zone of the Russian Federation. Available at: https://minec.gov-murman.ru/activities/CERArktic/soglach/

Figure 4. Value added multiplier for the regions of the European North of Russia (compiled with the use of [23])



production of the Northern regions is increasing. As a result, even the entities where the manufacturing industry has been in the lead are losing this position in a short period of time. A striking example is the north of the Irkutsk Oblast, which in 2010 belonged to the regions with a predominance of processing industries, and in two years it shifted into the category of natural resource territories [20].

As a result, the current state of industry in the regions of the North and the Arctic is characterized by fragmentation, low competitiveness, weakness of interregional relations, and inefficiency of institutions to promote the industry [21]. At the same time, the existing technological structure of the economy in the majority of the Northern and Arctic regions is characterized by *weak diversification with a predominance of industries of the initial stages of the technological cycle*. The value added multiplier[22] calculated by VolRC RAS researchers for the regions of Russia *(Fig. 4)* proves the above statement.

This problem becomes particularly acute and extremely important, because, according to Academician V.M. Polterovich, "without the help of the state, the market is not able to get out of the trap of technological backwardness" [24].

Therefore, in the current geopolitical and geo-economic conditions, an extremely important task is to develop the domestic market and produce innovative products with high added value on the basis of deep processing of resources of the North and the Arctic. It should be noted that at present there are certain reserves for addressing these issues. Thus, the capacity of the domestic manufacturing industry is extremely underutilized (as of 2017): by 20% – in the production of metal-cutting machine tools, by 14% – in the production of metal-forming machine tools, by 16% – in the production of tractors, by 18% – in the production of bulldozers, by 18% – in the production of excavators[23].

[22] The value added multiplier in this situation is understood as the ratio of the total value of the commodity mass produced by the enterprise to the value of primary raw materials involved in economic turnover. See, for example: [22].

[23] The level of use of the average annual production capacity of organizations for the production of certain types of products (annual data – from 2017) in accordance with the Russian Classification of Products by Economic Activities 2. Available at: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/enterprise/industrial/#

One of the priority directions for development of the Arctic Zone of the Russian Federation outlined in the Strategy is the implementation of major infrastructure projects providing for the *integration of the Arctic with the developed regions of Russia* for the purpose of effective use of the resource base of the macroregion. In this regard, the key direction for the development of the European North of Russia should be the use of its potential to solve the problems of the Arctic Zone of the Russian Federation, among other things, by developing an effective system of interregional economic cooperation.

In the USSR, effective cooperation was observed as part of a single national economic complex, "each territory of which was associated with other planned and organized economic and resource relations". At the same time, as the authors [25] point out, "it is no exaggeration to say that at that time the Arctic "worked" for the whole of the USSR, and the USSR – for the Arctic".

Thus, one of the main conditions for the effective use of the potential of the European North of Russia and its Arctic Zone is the active development of interregional cooperation along the "North–South" line through the design of interregional production cooperation in the form of vertically integrated technological value chains in non-resource sectors [26]. It should be noted that the first edition of the state program "Socio-economic development of the Arctic Zone of the Russian Federation for the period till 2020" included a sub-program on the development of long technological chains of value added that go beyond the North and the Arctic Zone of the Russian Federation; however, later it was abolished.

In our opinion, the development of vertical integration processes is relevant for such activities as oil refining, wood processing, pulp and paper industry, civil, science-intensive and precision engineering, food production, etc. This fact, in particular, is evidenced by the calculations carried out by VolRC RAS on the example of the integration of an iron and steel enterprise located in the European North, and an engineering economic entity that produces goods for the needs of the Arctic[24].

The need for the production of domestic goods in the framework of the policy of import substitution to solve the problems of development of the Arctic Zone of the Russian Federation was supported by top state officials. For this purpose, in 2017, the Department for Regional Industrial Policy of the Ministry of Industry and Trade of Russia developed a Basic catalog of high-tech industrial products and services for the needs of the Arctic Zone of the Russian Federation (for all federal districts of Russia), which contains information about more than 650 enterprises capable of producing a wide range of high-tech products for the Arctic. District catalogs cover such sections as vehicles, construction, road and special equipment, energy and electrical equipment, and communications equipment[25].

Vertical integration of these industries not only has a financial effect (reduction of production costs, growth of net profit), but also creates new jobs and favorable conditions for the introduction of innovative technologies and further development of production. Thus, the formation of unified technological chains in the economy of the European North and its Arctic Zone will help consolidate and rationally use resources to address critical issues and ensure sustainable development of the country's economy in the long term.

[24] See: *Methods to increase the efficiency of management of socio-economic development of the regions of the North in the context of solving the problems of the Arctic Zone of the Russian Federation: the final report on research*. Executed by T.V. Uskova, S.A. Kozhevnikov. Vologda, 2018. 135 p.

[25] The Ministry of Industry and Trade of Russia has prepared a catalog of high-tech products for the needs of the Arctic. Available at: http://minpromtorg.gov.ru/press-centre/news/#!minpromtorg_rossii_podgotovil_katalog_vysokotehnologichnoy_produkcii_dlya_nuzhd_arktiki

According to the Strategy and the state program for the development of the Arctic, the priority in this macroregion consists in the development of a unified national transport network. This will improve transport accessibility of settlements, eliminate infrastructure constraints on economic growth and create conditions for the integration of the Arctic Zone of Russia into the single economic space [27]. To achieve these goals, a number of projects aimed at the integration of the macroregion with Eastern territories are currently implemented (Belkomur project: Arkhangelsk–Perm; Barentskomur).

At the same time, much less attention is paid to the integration of the Arctic region with the central and southern territories. The importance of intensification of the processes of spatial and territorial development of the North and the Arctic today determines the need for an effective system of coordination of strategic processes in the development of both the leading industries and the infrastructure of the Arctic and Arctic regions [28].

In our opinion, the Vologda Oblast should play an important role as an outpost for the development of the North and the Arctic. One of the priority directions is to transform the city of Vologda into a developed transport and logistics center focused on foreign economic and interregional relations not only of the enterprises of the Vologda Oblast, but also of all regions of the European North of Russia, as well as other regions of the country[26].

This is facilitated by the fact that within the Vologda Oblast there are the following major railway transport corridors: "Transsib" (Vladivostok – Chelyabinsk – Buy – Vologda – Cherepovets – Babaevo – Saint Petersburg); "North–South" (Moscow – Danilov – Vologda – Vozhega – Arkhangelsk with a branch to Vorkuta and Murmansk).

A multimodal logistics center will help establish close cooperation of the Northern and Arctic territories of the country with the southern regions. The center can unite the counter-flows of goods and services to provide the Northern territories with food, essential products, machinery and equipment, and the Southern territories with raw materials and products of their processing for the further development of technological chains.

The results of our analysis indicate that the key problem of the Vologda railway transport hub is its limited capacity. According to the research of JSC Institute for Economics and Transport Development[27] and according to the analysis of the development Strategy of JSC Russian Railways[28], the Vologda transport hub will be a "bottleneck" by 2020.

To prevent this, it is necessary to work out a set of measures for the development of transport infrastructure and logistics services, taking into account international requirements (improvement of warehousing to the level of world standards; modernization of the railway junction, bus station and airport; improvement of transport flows in the city), recommendations for the formation of an effectively functioning urban transport system in Vologda, taking into account the development of agglomeration processes.

Interregional cooperation of the regions of the European North of Russia will help increase the connectivity of the territories, stimulate the domestic market, reduce barriers to the movement of resources, provide the

[26] This approach is enshrined in the strategy for socio-economic development of the Vologda Oblast until 2030 (approved by the Resolution Of the Government of the Vologda Oblast of October 17, 2016 No. 920), where one of the tasks in the field of integrated spatial development of territories is the development of multimodal transport and logistics hubs in agglomerations.

[27] Official website of JSC Institute for Economics and Transport Development. Available at: http://iert.com.ru/index.html?noupdate

[28] Official website of Russian Railways. Available at: http://annrep.rzd.ru/reports/public/ru?STRUCTURE_ID=4498

consumer market with a wide range of goods, and local producers – with a sustainable supply of raw materials and components.

In turn, if federal and regional authorities implement the proposed measures, it will create favorable conditions for sustainable deve-lopment and for the achievement of strategic objectives of the regions of the European North and the Strategy for development of the Arctic Zone of the Russian Federation. However, this requires a review of the main directions of state policy, ensuring the consistency of interests of the authorities, large business structures and the population on the basis of public-private partnership mechanisms in the implementation of major projects in key sectors of the region's economy [29, 30].

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Issues Related to the Motivation of Tenants of Forest Plots to Use Effective Methods of Reforestation in Russia*

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Abstract. The forest sector is a key sector in the Russian economy. The existing demand for forest products on the part of domestic and foreign consumers contributes to a steady increase in the volume of logging. At the same time the restoration of forest resources is becoming increasingly important. Detailed elaboration of this issue is a critical factor in maintaining the trend of enhancing the economic performance of the forest complex in the long term, on the one hand, and in ensuring environmental safety, on the other hand. In Russia the task of reforestation is mainly delegated to the tenants of forest plots. Today the problem of strengthening their interest in ensuring the quality of the works they perform is of great importance. The main goal of the study, the findings of which are presented in our paper, is to determine the mechanisms of formation of tenant behavior models that affect decision-making on the implementation of reforestation. We use methods such as system approach, analysis and synthesis, generalization and comparison, classification and systematization. Research findings of our study consist in the substantiation of the increase in the share of artificial reforestation as a factor that ensures the growth of forest use efficiency, as well as the mechanisms of formation of tenants' behavior in the planning and implementation of reforestation. We choose the forest complex of the Vologda Oblast as the main object for our study. Certain features of the current legislation are identified as the main problem of its potential development. In formulating our findings we use comparison with the models of the process of reforestation existing in Finland, where higher indicators of the qualitative composition of forests have been achieved. A distinctive feature of our study is its focus on the possibility of further application of its findings in the development of agent-based models. We carry out practical implementation of such models. With their help, it is possible to search for the most optimal solutions to determine the ways of shifting to a more effective model of reforestation.

Key words: forest complex, reforestation, agent-based modeling.

1. Introduction

The forest complex plays an important role in the Russian economy. The total stock of wood in Russia amounts to 82.1 billion cubic meters, and the share of valuable species comprises 77%. The volume of estimated cutting area is 635 million cubic meters, and the annual wood increment – 994 million cubic meters[1]. The country's forest resources make it possible to fully meet domestic needs for timber and wood products, as well as export these goods.

However, the significance of forests cannot be measured solely from an economic perspective. Being one of the most valuable renewable natural resources, they play an environment-forming and environment-protecting role. Forests growing on the Russian territory account for more than 1/4 of the world's wood biomass. In this regard, the optimal combination of forest management and conservation is an extremely important objective.

The problems of forest conservation and use are becoming more diverse and complex. Forest management standards are changing as they have to meet increased international, social, environmental and economic requirements. There are risks of deforestation from fires, pests and other adverse factors exacerbated by climate change, forests are losing their biodiversity.

[1] *Strategy of forest development in Russia up to 2020.* Approved by the Oder of Ministry of Industry and Trade and Ministry of Agriculture of Russia no. 248/482, dated 31.10.2008.

2. Reforestation in Russia

One of the key issues hindering the development of the forest complex in Russia is low wood removal per unit area of operational forests. Insufficient forest management prevents the use of forest soil fertility and maximizes wood increment, which in turn limits the possibility of increasing the harvesting volume in already operating forests, and in efficient reforestation does not ensure the reproduction rate of economically valuable forests on the most productive forest lands.

Over the past 20 years the annual reforestation volume has decreased by almost 2 times and has stabilized at the level of 800–900 thousand hectares (*Tab. 1*), while the share of artificial reforestation in recent years has not exceeded 21–23%.

The Vologda Oblast is among Russian regions whose economy largely depends on the forest complex. Among Russia's entities, it ranks second in production of industrial wood and chipboard; third – in production of plywood; fourth – in production of lumber[2].

The total forest area in the Vologda Oblast comprises 11,657.5 thousand ha including forest lands – 11,473.4 thousand ha. According to the State Forest Register, the total forest areas of the region's forest resources in January, 1st 2017 amounted to 1614.93 million m^3, including coniferous – 817.03 million m^3 (50.6%). The share of spruce stands comprised 26.6%, pine – 23.9%, birch – 36.6%, aspen – 11.3%, other species – 1.6%. The total wood stock in mature and over-mature forests is estimated at 1,074.6 million m^3.

For a long period, extensive forest exploitation aimed at removing coniferous wood stocks was carried out; no required attention was paid to the reforestation process. This was typical not only for the Vologda Oblast but also for all Russian regions. As a result, the share hardwood significantly increased, the sanitary and forest pathology state of forests deteriorated. Thus, according to the records of the Timber Fund in 1927, soft-wood occupied about 10% of the entire territory of the Vologda Oblast covered with forest. Today, this figure has reached almost 50%. To solve this problem, considerable attention has been paid to the efficiency of afforestation in recent times.

Despite the fact that researchers interpret the concept "effective reproduction of forest resources" is various ways, they have come to a consolidated opinion that there is a need to improve reforestation efficiency. N.A. Moiseev [1] interprets efficient reforestation as a complex of measures aimed at dynamically

Table 1. Performance of felling and reforestation in Russia, 2000–2016

Indicator	2000	2004	2006	2008	2010	2011	2012	2013	2014	2015	2016
Clear felling, thousand ha	622	658	671	742	781	904	873	969	928	939	996
Reforestation, thousand ha	914	734	821	829	813	857	840	870	864	803	843
including artificial, thousand ha	263	230	195	191	171	197	183	187	187	182	179
Coverage of reforested clear felling, %	147	112	122	102	88	84	83	81	80	75	74
Share of artificial reforestation, %	29	31	24	23	21	23	22	21	22	23	21
Compiled from: *Russia in Figures. 2017: statistical digest*. Rosstat. Moscow, 2017. 511 p.											

[2] *Development of the forest complex of the Vologda Oblast for 2014–2020: state program*. Approved by the Vologda Oblast Government no. 1110, dated 28.10.2013.

Table 2. Performance of reforestation volume in the Vologda Oblast in 2000–2017

Indicator	2000	2010	2011	2013	2014	2015	2016	2017
Reforestation, total, thousand ha	22.4	32.3	44.2	43.6	44.8	49	52	72.6
Including: artificial (planting)	7	4.5	6.4	6.2	6.4	6.7	7.2	7.8
promoting natural reforestation	15.4	27.8	37.8	37.4	38.4	42.3	44.7	64.3
Share of artificial reforestation, %	31	14	14	14	14	14	14	11
Compiled from: *Vologda Oblast in Figures: statistical digest*. Vologdastat, Vologda, 2018. 150 p.								

balancing the growing needs in the long run using events held in advance. According to P.V. Vasilyev [2], "the main condition and sign of expanded in advance reproduction is continuous increase in effective and potential stock of qualitative wood on the exploitation areas". N.I. Kozhukhov [3] refers to expanded forest reproduction as a process of continuous growth in productive capacity of communities.

Increased attention to issues of forest restoration from both scientific community and state administration bodies has begun to paid off. The total volume of reforestation activities in the Vologda Oblast during 2000–2017 increased more than 3 times (*Tab. 2*). At the same time, the volume of artificial reforestation remained at the level of 7–8 thousand ha, which is only 10.7% – almost two times lower than the average Russian indicators.

3. Reforestation practice: experience of Russia and Finland

It would be possible to assume that such a proportion of artificial and natural reforestation methods is a consequence of climatic conditions of the North of Russia and characteristics of the growing forest species. But, for comparison, in neighboring Finland, with similar natural conditions, the share of artificial (seeding, planting) reforestation reaches 80%. This is surprising, especially given that forest management practices in both countries use almost the same reforestation methods: natural (including measures to promote natural reforestation) and artificial such as seeding and planting of seedlings with bare and root-balled root system. Moreover, unlike Finland, Russia uses a combined reforestation method, which is a combination of natural and artificial methods. Although in Finnish forestry this method is not highlighted, they also try to supplement forest areas with self-seeding, which increases the density and enrich the composition of artificial plantations [4].

In both countries, reforestation is regulated by the state. But it should be noted that the Reforestation Rules, approved by the order of the Ministry of Natural Resources of the Russian Federation no. 375, dated 29.06.2016, according to which all reforestation activities in our country are carried out, describe the entire procedure of activities in more detail compared to the regulations in Finland. These Rules represent a detailed instruction on the choice of reforestation method depending on the state of the forest area, soil type, and presence of undergrowth. At the same time, when elaborating the Rules, it was almost impossible to take into account all natural and climatic features of each forest area, and the changing economic and social conditions due to the large size of the Russian territory.

Finnish legislation in the sphere of reforestation (forest and nature protection legislation, the law on planting stock trade, orders of the Ministry of Agriculture and Forestry) establishes minimum requirements for reforestation and use of planting material

(seedlings and seeds). Immediate methods of creating forest crops, selecting methods and means of reforestation are regulated by internal guidelines of forest using enterprises, with the level of requirements often exceeding minimum requirements of the country's legislation. Moreover, reforestation requirements are laid down in the forest certification program of Finland.

Yet, despite the similarity of approaches to forest management in both countries, there are fundamental differences in the ratio of reforestation methods used. In Finland, for example, the share of natural reforestation (including its promotion) is around 20%, and 80% of reforestation activities is associated with the creation of new forest crops. At the same time, as *Table 1* shows, the ratio of these types of reforestation in the Russian Federation is exactly the opposite. And in the regions of its North-West, where climatic conditions are most close to those in Finland, the share of artificial reforestation in the total amount of the works is even lower: for example, for the Vologda Oblast (see Tab. 2), the ratio is 11% of planted forests vs. 89% of natural forests. On the one hand, this situation has developed largely under the influence of economic factors and organizational and technological capabilities of Russian forest users. But, on the other hand, we cannot but point out the fundamental difference in the very approach to reforestation. Thus, in Russia, artificial reforestation is used only if the use of combined and natural reforestation cannot ensure the creation of valuable forest species on the land plot.

A distinctive feature of the Finnish approach to the choice of the method of reforestation is the final profitability, and the main task is to grow a new forest stand on a forest plot in a reasonable time; the forest stand should consist of the wood species that are the most valuable from an economic point of view and the most stable in terms of the possibility of growth in the existing soil and climatic conditions. At the same time, if we assess the economic costs of the entire cycle of forest management from reforestation and up to the main felling, then we find out that natural reforestation, taking into account all the necessary work to preserve the undergrowth, felling care and clarification, is not always less expensive in comparison with artificial reforestation. Especially when it is necessary to repeat the works due to the failure of natural reforestation. According to the experience of Southern Finland, planting or sowing compared to natural renewal helps reduce the time in which forest species reach maturity up to five years, which is needed for basic logging for pines and up to 15 years for spruce. In addition, the delay in reforestation only for five years reduces the economic productivity of forests by a quarter [5].

Table 3. Comparison of the effectiveness of reforestation methods, %

Forest species	Reforestation method	Results	
		Good	Satisfactory
Spruce	Planting	61	27
	Seeding	38	31
	Promoting natural reforestation	19	20
Pine	Planting	55	25
	Seeding	45	27
	Promoting natural reforestation	34	22

Own compilation with the use of the source: Saksa T., Kankaanhuhta V. *Metsänuudistamisen laatu ja keskeisimmät kehittämiskohteet Etelä-Suomessa*. Metsäntutkimuslaitos, Suonenjoen yksikkö. 90 s.

The high efficiency of reforestation methods such as planting and seeding was confirmed by the results of the inventory of reforestation objects (2000–2006) in Southern and Middle Finland *(Tab. 3)* [6].

In Finland, three quarters of forest plots are privately owned. In this regard, the Finnish forest use standards are not so thoroughly regulated in comparison with the Russian ones. The long history of private forest ownership in Finland contributes to a high level of interest in efficient management on the part of owners, which ultimately leads to a higher level of income. And it is the potential rather than the momentary income that is decisive in the organization of reforestation. Moreover, the costs are taken into account throughout the whole period of cultivation of forest crops, and in practice the low-cost method of reforestation is often not the most profitable one.

When comparing the cheapest method of creating forest stands – natural restoration – with a more expensive, artificial one, we can say that the first method is much less reliable. The final result here largely depends on such parameters as the quality of seed trees and the yield of seeds during the period of regrowth of the felling site. At the same time, it is difficult to achieve the desired composition of tree species and ensure high rates of their growth at the initial stage of development. In addition, there are significant financial costs and time costs of agronomic care so as to avoid the possibility of suppression of self-seeding with grass, and provide additional reseeding in case of insufficient density of the undergrowth [7].

In this regard, Finnish forest owners see reforestation not as an additional burden to the harvesting process, but as part of a continuous forest management process. Thus, the current situation concerning income and expenses affects the decision to carry out logging and, as a consequence, to ensure reforestation measures [8]:

$$NVP = \sum_{i=1}^{t} \frac{T_i}{(1+r)^i} - \sum_{n=1}^{t} \frac{K_n}{(1+r)^n},$$

where NVP is the net value present of the income;

T_i – income from cutting;

K_n – the cost of forestry;

t – felling cycle, years;

i – income, year;

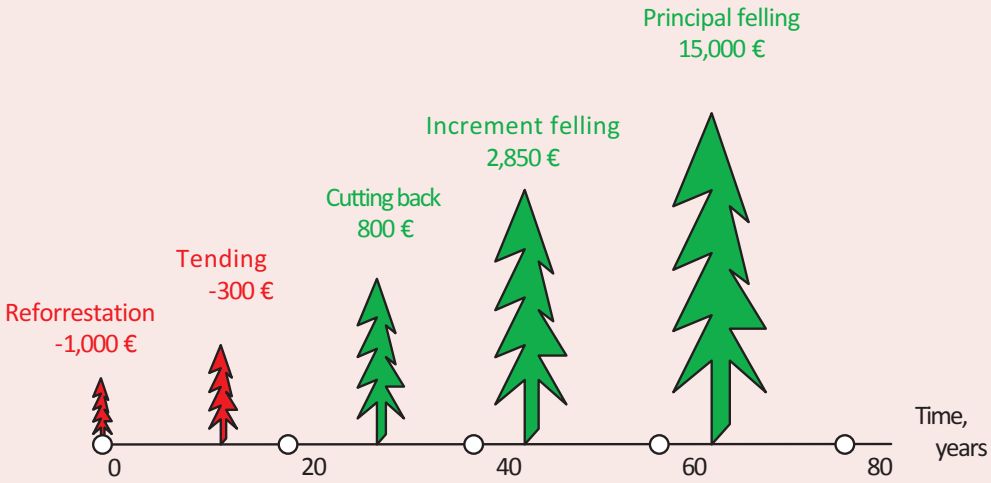
n – expenses, year;

r – interest rate.

Table 4. An example of calculating the present value of the income of the forest management project at the plot of shamrock and bilberry spruce forest in southern Finland

Year	Incomes/ expenses	NVP (r=0.03)	Calculation formula	Notes
0	-1000	-1000	$=1000/(1+0,03)^0$	First year: 2000 spruce seedlings / ha, cost: 1000 EUR/ha
13	-300	-204	$=300/(1+0,03)^{13}$	After 13 years: care for young seedlings, cost: 300 EUR/ha
30	+800	+330	$=800/(1+0,03)^{30}$	After 30 and 45 years: profit from two commercial improvement cutting
45	+2850	+754	$=2850/(1+0,03)^{45}$	
65	+15000	+2196	$=15000/(1+0,03)^{65}$	After 65 years: profit from the main felling
Current estimate of incomes	3280		=330+754+2196	
Current estimate of expenses	1204		=1000+204	
Current net value of incomes (r = 0,03)	2076		=3280-1204	The forest owner chose a 3 percent rate to estimate the expected yield. The value of NVP>0 indicates the benefit of investing in the forest plot.
Compiled with the use of the source: Nyugren M. *Reforestation in Finland.* Joensuu: Natural Resources Institute Finland, 2005.				

Figure 1. Stages of forest management activities for the forest management project at the plot of shamrock and bilberry spruce forest in southern Finland



Compiled with the use of the source: Nyugren M. *Reforestation in Finland.* Joensuu: Natural Resources Institute Finland, 2005. 22 p.

Table 4 shows an example of calculating the present value for a forest management project on a site of shamrock and bilberry spruce forest in southern Finland. The project involves five stages: planting of seedlings, care for the young growth in 13 years, improvement cutting in 30 and 45 years and the main felling in 65 years *(Fig. 1)*.

The solution that leads to the highest real net worth would be the optimal solution. Thus, investing in reforestation is beneficial provided that the NVP at the selected interest rate remains positive.

4. Factors affecting the choice of reforestation method by Russian forest users

It would seem that orientation toward long-term profit is quite an objective criterion when choosing an effective method of forest management, and in particular when choosing a method of reforestation. And if the experience of Finland proves the advantages of artificial reforestation over natural reforestation, then we can assume that in the North-West of Russia, and in particular in the Vologda Oblast, this method of reforestation should prevail. But in this case, the current legislation of the Russian Federation is beginning to play a key role.

In accordance with the Forest Code of the Russian Federation, the transfer of forest areas to forest users for timber harvesting is carried out on the basis of lease agreements of the forest area concluded following the auctions. Arranging and conducting the works on reforestation on such sites shall be provided by their tenants and performed in strict accordance with the rules of reforestation approved by Order No. 375 of the Ministry of Natural Resources of Russia dated June 29, 2016.

The term of the lease agreement can be from 10 to 49 years. But the practice of recent years shows that all lease agreements are concluded for the maximum period – this is due to the fact that longer lease terms will contribute to increasing the responsibility of forest users with regard to timber harvesting, reforestation, and forest care activities. But is this really the case?

Table 5. Ages of forest felling for the Vologda Oblast

RF constituent entity	Forest-forming species	Quality class	Ages of forest felling, years	
			Protective forests	Commercial and reserved forests
Vologda Oblast	Pine, larch, spruce	III and higher	101 – 120	81 – 100
		IV and lower	121 – 140	101 – 120
	Birch, black alder	All quality classes	71 – 80	61 – 70
	Aspen, gray alder	All quality classes	51 – 60	41 – 50
	Willow	All quality classes	51 – 60	41 – 50
Compiled with the use of the source: "On establishing the age of felling": Order No. 105 of the Federal Forestry Agency dated April 9, 2015.				

The social, environmental and even economic justification of these terms of lease of forest areas have already aroused great doubts at the stage of discussion of the draft Forest Code of the Russian Federation [9, 10].

It takes several decades to restore forests using any method. Thus, according to Order No. 105 "On establishing the age of felling" dated April 9, 2015 of the Federal Forestry Agency, felling ages for the Vologda Oblast are established depending on forest forming breed and quality class from 81 to 140 years for coniferous breeds and from 41 to 80 years for deciduous breeds *(Tab. 5)*. At the same time, according to the Forest Plan of the Vologda Oblast, pine, spruce, birch and aspen belong to the target forest tree species. That is, if the term of the lease agreement is limited to 49 years in accordance with the current legislation, the tenant may be interested in ensuring effective reforestation only in the first 10 years of the lease agreement and only in forest areas with the least valuable forest species, such as aspen, alder, and willow tree.

This problem can be partially solved with the help of a provision contained in the Forest Code of the Russian Federation, according to which the former tenant who has properly executed the lease agreement of the forest plot has the preferential right to conclude a lease agreement for this forest plot for a new term. That is, it is assumed that a conscientious tenant who performs all the necessary requirements for the development of the forest plot actually becomes its owner (tenant at will) and therefore should be interested in carrying out effective measures for reforestation and forest care in order to obtain greater profits in subsequent periods for his/her descendants. But the very possibility and conditions of using the pre-emptive right to conclude a lease agreement cause a lot of economic and legal issues.

There is a question regarding the procedure for determining the size of the rent at the conclusion of a new lease agreement. It would seem that a conscientious tenant who has properly fulfilled all the conditions under the previous contract can count on a certain economic incentive in the form of a reduction factor in the calculation of the rent. But today the size of the rent at implementation of the preferential right to conclude the lease agreement of the forest plot with the former tenant is defined on the basis of Resolution No. 53 of the Government of the Russian Federation "On establishing the procedure for determining the size of the rent under the lease agreement of the forest plot concluded according to Item 2 of Part 4 of Article 74 of the Forest Code of the Russian Federation" dated February 1, 2016.

Table 6. Results of auctions on the lease of forest plots in the Vologda Oblast in 2015–2017

No.	Initial price, rub.	Land plot area, ha	Initial price of 1 ha, rub.	Price offered by the winner, rub.	Increasing factor
2015					
1.	5 106 620.79	26 365.00	193.69	5 106 620.79	1.00
2.	282 089.90	1 898.00	148.62	1 001 419.40	3.55
3.	337 221.95	7 743.60	43.55	505 832.95	1.50
4.	317 911.30	11 708.00	27.15	604 031.56	1.90
5.	424 663.22	9 808.00	43.30	913 025.90	2.15
6.	264 304.30	5 026.00	52.59	370 026.06	1.40
7.	420 697.74	2 754.00	152.76	2 482 116.96	5.90
8.	747 269.76	1 930.00	387.19	971 450.70	1.30
9.	2 574 004.55	7 371.00	349.21	8 108 114.44	3.15
10.	988 306.51	5 570.00	177.43	1 284 789.49	1.30
11.	231 755.52	1 747.00	132.66	3 012 822.72	13.00
12.	1 013 088.00	8 741.00	115.90	12 106 401.60	11.95
13.	481 223.65	4 647.00	103.56	6 231 845.67	12.95
14.	174 287.45	2 464.00	70.73	174 287.45	1.00
15.	5 500 089.08	14 906.00	368.98	5 500 089.08	1.00
16.	6 292 355.33	24 526.00	256.56	6 292 355.33	1.00
17.	471 081.79	1 332.60	353.51	1 507 461.75	3.20
18.	1 050 603.30	1 497.60	701.52	1 418 314.49	1.35
19.	534 471.59	3 648.00	146.51	1 309 455.41	2.45
20.	302 471.53	5 573.00	54.27	5 625 971.69	18.60
2016					
21.	2 373.12	226.00	10.50	2 373.12	1.00
22.	1 025 184.00	4 669.00	219.57	1 076 443.20	1.05
23.	1 244 496.52	6 529.00	190.61	1 306 721.35	1.05
24.	1 275 884.00	9 734.60	131.07	1 275 884.00	1.00
25.	111 154.87	44 577.00	2.49	122 270.35	1.10
26.	78 608.46	4 618.00	17.02	78 608.46	1.00
27.	173 731.20	5 543.00	31.34	173 731.20	1.00
28.	1 368 716.22	6 949.00	196.97	1 368 719.22	1.00
2017					
29.	284 880.18	3 839.00	74.21	2 578 165.79	9.05
30.	1 752 829.44	8 439.00	207.71	1 752 829.44	1.00
31.	1 171 015.93	3 400.00	344.42	2 751 887.53	2.35
32.	314 844.77	4 514.00	69.75	314 844.77	1.00
33.	8 712 948.98	62 753.00	138.85	26 138 846.98	3.00
34.	376 304.49	2 382.00	157.98	1 016 021.97	2.70
35.	707 969.28	5 366.00	131.94	1 309 743.10	1.85
36.	362 789.88	3 809.00	95.25	1 179 066.93	3.25
37.	1 779 217.00	14 955.00	118.97	5 693 494.40	3.20
38.	1 162 691.57	11 970.00	97.13	4 127 555.15	3.55
39.	2 259 912.96	4 314.00	523.86	5 197 799.86	2.30
40.	1 313 040.00	2 190.00	599.56	2 954 340.00	2.25
41.	7 964.24	92.00	86.57	7 964.24	1.00
42.	4 961 805.20	25 797.00	192.34	5 209 895.46	1.05

Source: own elaboration on the basis of the data from the official website of the Russian Federation that contains information about auction (https://torgi.gov.ru).

According to this method, the amount of rent under the lease agreement is determined by the formula:

$$R = R_{MIN} \times F_I,$$

where: R_{MIN} – the minimum size of the rent under the lease agreement defined according to Parts 2 and 3 of Article 73 of the Forest Code of the Russian Federation (rubles);

F_I – the increase factor calculated according to the formula:

$$F_I = \frac{R_{auction}}{R_{initial}},$$

where: $R_{auction}$ – the size of the rent formed according to the results of the auction on the sale of the right to conclude the executed lease agreement (rubles);

$R_{initial}$ – the initial price of the subject of the auction (the initial amount of rent) (rubles).

In 2015–2017, we analyzed the auctions on the lease of forest plots in the Vologda Oblast and found out that the increase factor for various auctions ranges from 1.0 to 18.6 *(Tab. 6)*. The very value of the increase factor can hardly be called objective, even at present. It does not depend directly either on the area of the plot or on the initial price, but rather is a kind of derivative of the ability of bidders to negotiate, because the auctions are held in an open form, and their participants tend to know each other well. Accordingly, it is useless to talk about objectivity with regard to the increase factor after 49 years.

Table 7. The rate of payment per unit of timber volume of forest stands of the Arkhangelsk-Vologda district

Wood species	Stumpage price rate	Transportation distance	Rate of payment for 1 solid cubic meter			
			Industrial wood without bark			Fuel wood (with bark)
			large	medium	small	
Pine	1	Under 10	126.72	90.54	45.36	2.88
	2	10.1–25	115.2	82.44	41.4	2.88
	3	25.1–40	97.92	69.84	35.1	2.52
	4	40.1–60	75.06	53.28	27.36	2.52
	5	60.1–80	57.24	41.4	20.7	1.44
	6	80.1–100	46.26	33.3	16.56	1.44
	7	100.1 and more	34.74	24.84	12.6	1.08
Spruce	1	Under 10	114.12	81.72	41.4	2.88
	2	10.1–25	103.5	73.8	37.26	2.88
	3	25.1–40	87.84	63.54	30.96	2.52
	4	40.1–60	67.32	48.78	23.58	1.44
	5	60.1–80	51.66	37.26	19.26	1.44
	6	80.1–100	41.4	29.52	15.12	1.08
	7	100.1 and more	30.96	22.14	11.52	1.08
Birch	1	Under 10	63.54	45.36	23.22	3.78
	2	10.1–25	57.24	41.4	20.7	3.78
	3	25.1–40	49.14	35.1	16.92	2.88
	4	40.1–60	37.62	27.36	12.96	2.52
	5	60.1–80	28.8	20.7	10.8	2.16
	6	80.1–100	23.22	16.56	8.1	1.44
	7	100.1 and more	16.92	12.6	6.66	1.08
Aspen	1	Under 10	12.6	9.18	5.22	0.36
	2	10.1–25	11.52	8.1	4.14	0.36
	3	25.1–40	9.9	7.38	2.88	0.36
	4	40.1–60	7.38	5.58	2.52	0.36
	5	60.1–80	5.58	4.14	2.52	0.14
	6	80.1–100	5.22	2.88	1.44	0.14
	7	100.1 and more	2.88	2.52	1.44	0.11

Compiled with the use of the source: Resolution No. 310 of the Government of the Russian Federation "On the rates of payment for a unit of forest resources and on the rates of payment for a unit of forest plot area in federal ownership" dated May 22, 2007.

We should also note that rent is calculated with the use of such an indicator as the minimum size of the rent under the lease agreement; it is determined in accordance with Parts 2 and 3 of Article 73 of the Forest Code of the Russian Federation and calculated on the basis of Resolution No. 310 of the Government of the Russian Federation "On the rates of payment for a unit of forest resources and on the rates of payment for a unit of forest plot area in federal ownership" dated May 22, 2007. The rate of payment per unit of timber volume of forest stands of the Arkhangelsk-Vologda district is given in *Table 7*.

The amount of the minimum rent is directly influenced by such factors as the composition of the forest species of the plot, their quality, the total amount of wood on the plot and the degree of development of forest infrastructure. That is, in the case of high-quality reforestation, forest care and the development of forest infrastructure both at the expense of the tenant and with the help of other sources (for example, the development of the federal and regional road network, the implementation of projects to create forest clusters), rental rates can significantly increase, which, on the one hand will reflect the potential increase in the cost of reserves in the forest plot, and on the other hand will lead to an increase in the costs for the tenant.

In addition to economic issues regarding the implementation of the preferential right to conclude lease agreements, there exist quite a few legal issues [11].

First, as practice shows, Russian forest legislation has been continuously changing in recent years; thus it does not protect tenants from any possible changes. Such a situation is likely to cause the need to conclude a new contract, or it can simply lead to the termination of the existing one.

Second, of the tenants perform their obligations properly under the forest lease agreement, it still does not guarantee the possibility of their concluding a new contract on the same terms, even if they have a preferential right. The lessor, in accordance with the current legislation, may refuse to conclude a new contract with the tenant. In this case, the refusal will be considered legitimate when concluding a contract with a new tenant within one year from the date of expiration of the previous contract.

Thus, the existing procedure of providing forest plots for lease for timber harvesting contains virtually no economic incentive for forest users to organize measures for enhanced reforestation.

Of course, we can assume that for tenants who have entered into lease agreements with the increasing factor close to one, the preferential right to conclude new lease agreements can be considered as an incentive for such work. But in view of all other factors, its impact is very small.

Along with the above attempt to encourage tenants to ensure quality reforestation by providing preferential right to conclude a lease agreement for a new term, Russian legislation provides for a number of punitive measures applied to the tenants who are negligent in the performance of their duties.

Such measures could include fines and an early termination of the lease agreement. But we can hardly recognize these measures as effective.

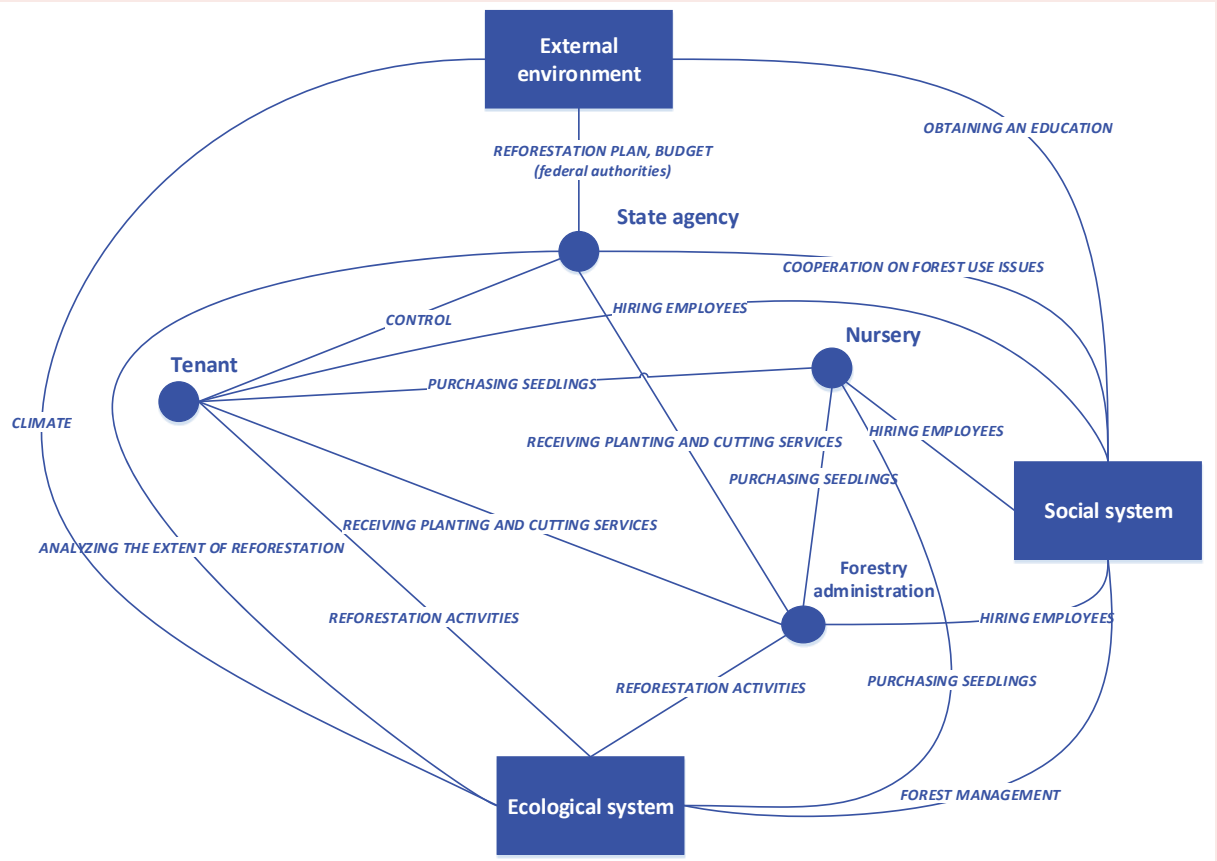
Thus, according to Article 8.27 of the Code of the Russian Federation on Administrative Offenses, the violation of rules of reforestation, afforestation, forest care and forest seed growing is punished by the warning or the imposition of an administrative penalty. For citizens, the amount of the fine is from 200 to

500 rubles; for officials – from 500 to 1,000 rubles; for legal entities – from 5,000 to 10,000 rubles. As you can see, the amount of fines is not comparable with the cost of renting a forest plot, or with the profit, or even with the minimum necessary costs for the formal implementation of reforestation measures.

A slightly more pronounced effect, particularly for the loggers who intend to use the plot for a long period of time and who do not focus on immediate profit, is provided by the possibility of early termination of the lease agreement. Given the shortage of available forest plots with the desired characteristics related primarily to transport accessibility, the cases of termination of lease agreements due to the failure to implement reforestation measures are extremely rare. Tenants try to comply with the requirements of forest legislation. At the same time, there is also a reverse side to the termination of the lease agreement of the forest plot, concluded by the results of the auction: in accordance with the Forest Code of the Russian Federation, such agreement is terminated only in court. In general, taking into account the likely judicial appeals, this procedure may be delayed for several years. During this period, the forest plot can be significantly damaged.

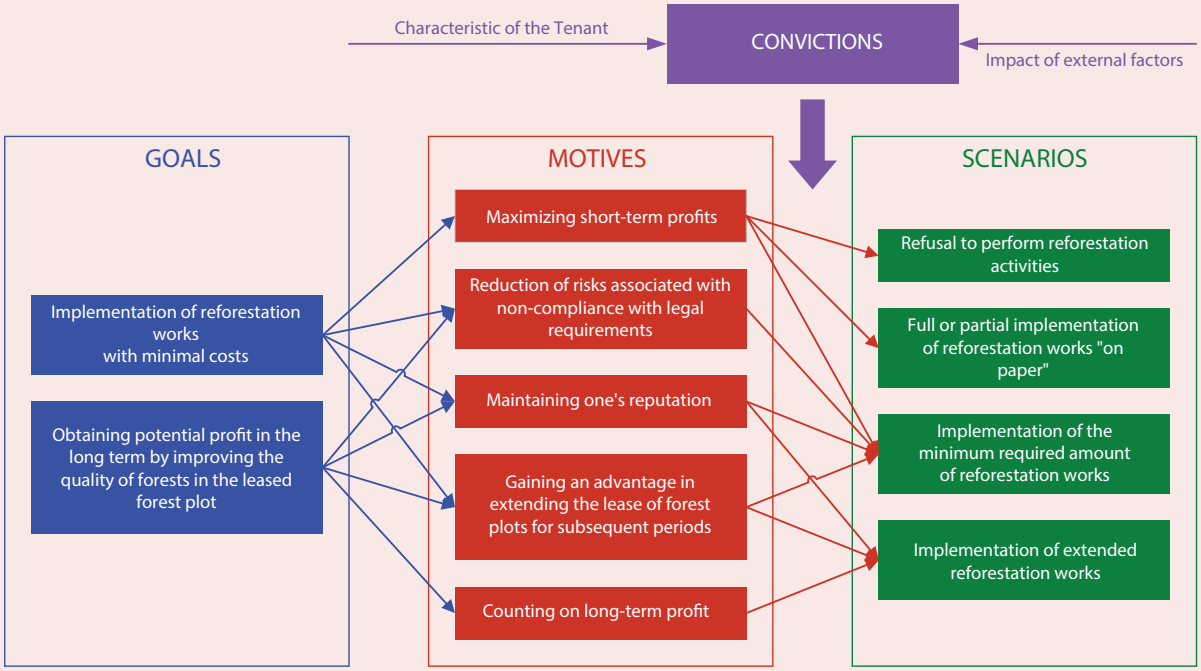
In general, it is necessary to recognize that the current forest legislation provides for the

Figure 2. General functional diagram of reforestation model



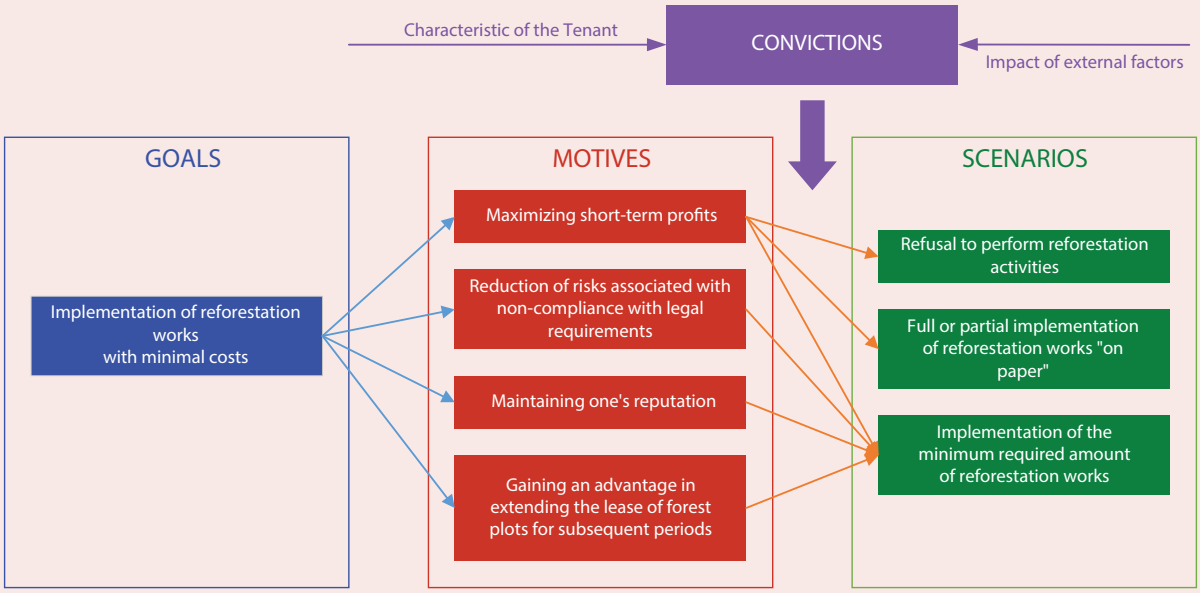
Source: Gulin K.A., Dianov S.V., Antonov M.B. An agent-based approach to implementing the model of forest restoration. *Problemy razvitiya territorii*, 2018, no. 1 (93), pp. 83-97.

Figure 3. Algorithm for selecting a scenario of behavior for the Tenant agent



Source: Gulin K.A., Dianov S.V., Antonov M.B. An agent-based approach to implementing the model of forest restoration. *Problemy razvitiya territorii,* 2018, no. 1 (93), pp. 83-97.

Figure 4. The algorithm for selecting the scenario of behavior for the Tenant agent in accordance with current legislation



Source: own compilation.

implementation of the minimum necessary requirements for reforestation, but in no way stimulates forest users to organize high-quality enhanced reforestation.

5. Possibilities of applying agent-based models in choosing and implementing new approaches to reforestation

In the modern Russian practice of forest management, the way of natural reforestation with the adoption of all possible measures to increase the volume of measures promoting it is actually recognized as the main one. This state of affairs cannot fully ensure a qualitative result, and today it is necessary to move to an intensive model of forest management [12]. At the same time there is a need to create simulation models that can provide the process of management decision-making in the selection and implementation of new approaches to reforestation.

Due to the high complexity of the real system of the forest complex, as well as the duration of the processes occurring in the forestry, the choice of adequate tools to solve the problem of modeling is of particular relevance. We think that agent-based modeling is the most promising tool to be used in this field. Its distinctive feature is the use of software entities – agents that have their own behavior and are able to interact. This makes it possible to simulate a system that most closely corresponds to reality [13]. Recently, agent-based modeling is increasingly used in simulation modeling of various processes in the forestry [14–24].

In the work "An agent-based approach to implementing the model of forest restoration" [25] we propose a paradigm for constructing a reforestation model as a sub-model of the regional forest complex using agent-based modeling. Within its framework, a functional scheme of the reforestation model was developed *(Fig. 2)*.

The key agents in this scheme are Tenant agent and State Department agent. Within the framework of the model, the Tenant is a legal entity or individual entrepreneur who has a lease agreement for a forest area for the purposes of timber harvesting. The Tenant performs the function of reforestation in accordance with the existing requirements. For its implementation, it cooperates with the State Department.

Each agent has its own behavior model, the elements of which are the goals of functioning, beliefs, motives, and scenarios. The goals set the parameters for the values of the characteristics of the agent that it seeks to achieve. Scenarios contain the possible algorithms of actions for the agent to achieve the goals *(Fig. 3)*. Motives and beliefs help choose a scenario for the agent's behavior in relation to specific conditions. Motives determine the priority, and beliefs – the possibility of the scenario.

From the reforestation perspective, the Tenant can pursue two objectives:

– executing the required reforestation works with minimal costs;

– obtaining potential profits in the long term by improving the quality of forests in the leased forest plot.

Certain motives correspond to these goals, and, depending on their own beliefs and the influence of external factors, the Tenants choose a particular scenario.

It would seem that the task of modeling the behavior of the Tenant is quite easy. It is necessary to create such external impacts that would help the Tenants make long-term profits their main goal. But, as it was shown above, within the framework of the current legislation it is not so simple to do.

Therefore, we can say that the main and only goal of the Tenant in the performance of

reforestation is to minimize costs, and the algorithm for selecting the scenario is greatly simplified *(Fig. 4)*.

6. Conclusion

Thus, having compared the approaches to reforestation in the North-West of Russia, in particular in the Vologda Oblast, and in Finland, we can note that, despite the fact that all loggers pursue a common goal – obtaining profit, the main task for Russian entrepreneurs in the implementation of forestry activities is to minimize costs in any acceptable way, while Finnish forest owners primarily set the task of increasing potential profits in the long term.

And the main task in the modeling of reforestation processes in the framework of agent-based models is to determine the conditions under which it is possible to achieve targets for enhanced forest reproduction.

The main contribution of our work to the development of theoretical and applied science is the fact that it determines the mechanisms for the formation of the behavior of forest plot tenants in the planning and implementation of reforestation; these mechanisms can be used to find optimal solutions and determine the ways for transition to more effective models of reforestation.

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MODELING AND FORECAST OF SOCIO-ECONOMIC PROCESSES

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Integrated Agent-Based Model of Labor Potential Reproduction of a Municipal Formation*

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Abstract. The article presents the author's developments in the field of agent-based modeling of labor potential reproduction that help build scenario forecasts of labor potential dynamics and test various options of management actions, choosing the optimal ones. The model simulates processes of the formation, distribution and use of labor potential of a municipal district, taking into account activities of the agents of three levels: individuals (carriers of labor potential, agents-people), legal entities (employers, agents-firms), municipal authorities. Agents-people and agents-firms are present in the model explicitly as separate types of agents. The starting number of agents-people is determined at the rate of one person from each ten. "Firms" are considered in aggregate due to available statistical data: each corresponds to one type of economic activity. Thirteen agents-firms are presented as a total. Agents-authorities are present in the model implicitly and form the functioning environment of agents of other types. Their behavior is set exogenously. The model is implemented in the simulation system AnyLogic Professional and tested on the data of the Velikoustyugsky Municipal District of the Vologda Oblast. The research information base consists of the materials, provided by the Territorial Body of the Federal State Statistics Service of the Vologda Oblast, as well as the database of the questionnaire surveys conducted by the Vologda Research Center of the Russian Academy of Sciences in the region. The advantages of the proposed approach, which make up its scientific novelty, include the fact that the model reproduces a current state and dynamics of labor potential in unity and relationship of its quantitative and qualitative aspects, simulates basic processes of each phase of labor potential reproduction, takes into account features of

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municipal statistics and authorities' real powers. In addition, to describe people-agents' labor potential quality, agent-based modeling uses a concept of qualitative characteristics of the population for the first time and each agent is endowed with eight basic qualities: physical and mental health, cognitive and creative potential, sociability, cultural and moral levels, achievement need. The agents of the same sex and age are not the same in the model.

Key words: agent-based model, labor potential, labor potential reproduction, quality of population, municipal level.

Introduction

Reproduction of labor potential is one of the most problematic processes of the municipal level in recent decades. For example, in the Vologda Oblast since 2000 the working-age population has decreased by at least a quarter in more than half of the municipal districts. The structure of labor potential and trends of its formation, distribution and use are extremely unfavorable. Full restoration of the functioning labor potential is not observed either in quantitative or qualitative terms, thus we can only speak about contracted reproduction [1].

The sources and root causes of these problems lie both at macro and micro levels. Therefore, to break negative trends gradually is possible only by creating appropriate macroeconomic conditions and a favorable environment for labor potential functioning and effectively managing micro-level reproductive processes with regard to qualitative characteristics and behavior of the carriers of labor potential, i.e. individuals living in the territory of a municipality.

The management of labor potential reproduction is a complex and responsible task that demands consideration of a current state of the problem and puts forward increased requirements not only to decision makers' skills, but also to the tools used for these purposes. At the moment, agent-based models, which have already received great recognition abroad [2; 3] and are gradually gaining popularity in Russia, are one of the most promising and flexible tools that can help develop adequate management decisions at various levels [4; 5].

As shown by our analysis [6], today all the necessary prerequisites to systematically implement agent-based models in the real practice of municipal government have been created in Russia: 1) the necessary stages of economic thought and information technology development are undergone; 2) the human factor role in socio-economic development is widely recognized; 3) the government and society show great interest in the issue of state and municipal management efficiency; 4) the regulatory and legal framework for strategic planning at management levels is formed. All this inevitably leads to the gradual informatization of management decision-making and the search for appropriate tools, such as agent-based models, giving an opportunity to simulate the control object most close to reality.

This class of models, based on the behavior of many heterogeneous agents, can become the most useful tool for decision makers, since it deals with problematic processes on the same level as managers [7, p. 121]. At the same time, in the society, artificially simulated "from bottom-up", [8; 9] emergence phenomena and the self-organization processes can be observed, [10] though they are not initially programmed by a modeler. But the main thing is that by experimenting on an artificial society, the authorities are able to test management decisions and select the optimal ones that give

the best result in the implementation [5], get the experience, information and knowledge about a management object, which is impossible and unethical to acquire through direct experiment on a real society.

Thus, the need for an adequate, modern and effective tool to test management decisions, as well as the severe situation in the field of labor potential reproduction outside large cities and the significant role of individual characteristics and behavior of individual agents in the reproductive process predetermine the relevance of agent-based modeling of labor potential reproduction at the municipal level.

The analysis of the Russian and foreign experience to work out agent-based models, dealing with different aspects of labor potential reproduction, shows the following: first, the integrated approach to the definition of labor potential of a territory, taking into account the essence and depth of this concept, is practically not used in the models built at the moment, except for E.D. Sushko's works [11]; second, most models simulate certain aspects of reproduction, such as natural movement, labor market dynamics or labor behavior, and do not consider the entire reproductive cycle; and third, the model simplification of the real system does not always comply with the logic of the main phase processes, for example, if the unemployed are excluded from the model [12], the reproduction of the labor potential use phase is distorted [13].

In addition, the qualitative characteristics of workers are considered mainly within the framework of the human capital theory [14] and reduced to general and special skills [15]; it significantly reduces the possibility of analyzing the problems to reproduce a qualitative component of labor potential. Labor potential quality is a broader concept reflecting the whole complex of person's various features and abilities that are required in labor activity. For example, moral and cultural levels or achievement need are not skills. Nevertheless, according to the results of the sociological monitoring of the qualitative state of labor potential of the Vologda Oblast population, conducted by the Vologda Research Center of the RAS in the region, more than a third of the working age employees consistently note the importance of the presence of developed moral qualities and high general culture for the successful implementation of labor activity. Less than 10% of the employees consider these qualities not important at all. This fact suggests the need to take better account of qualitative characteristics of the population in modeling labor potential reproduction.

The present study is aimed at elaborating a comprehensive agent-based model to reproduce labor potential of a municipal district, simulating the processes of formation, distribution and use of labor potential, taking into account the actions of agents of three levels: 1) individuals (carriers of labor potential), 2) legal entities (employers), 3) municipal authorities. To achieve the goal, the following tasks are solved: the conceptual model of labor potential reproduction at the municipal level is developed; the conceptual model is implemented in the form of an agent-based model; the model is tested on one of the Vologda Oblast districts; the model is calibrated and the series of computational experiments to simulate the dynamics of labor potential reproduction at different values of the controlled parameters of the model is carried out.

The advantages of the proposed approach, which make up its scientific novelty, include the fact that the model reproduces a current state and dynamics of labor potential in unity and relationship of its quantitative and qualitative

aspects, simulates basic processes of each phase of labor potential reproduction, takes into account features of municipal statistics and authorities' real powers. In addition, to describe people-agents' labor potential quality, agent-based modeling uses a concept of qualitative characteristics of the population for the first time and each agent is endowed with eight basic qualities: physical and mental health, cognitive and creative potential, sociability, cultural and moral levels, achievement need. The agents of the same sex and age are not the same in the model.

Methodology

Let us consider the theoretical and methodological and information base of the study, as well as the specific methodology of the model.

Along with the above-mentioned concept of qualitative characteristics of the population, developed by the ISESP RAS and used by us to determine structural components of labor potential quality, the theoretical basis of the study includes:

1. the theory of labor potential and its reproduction, developed by A.S. Pankratov [17];

2. the integrated approach to understanding the essence of the socio-economic category "labor potential of a territory", presented in the works of I.S. Maslova. It allows us to consider labor potential as a "generalizing characteristic of the measure and quality of a set of abilities to work" [18, p. 14]. In quantitative terms it is estimated according to a number of the working age population, and in qualitative terms – according t o a level of development of qualitative characteristics of the working age population;

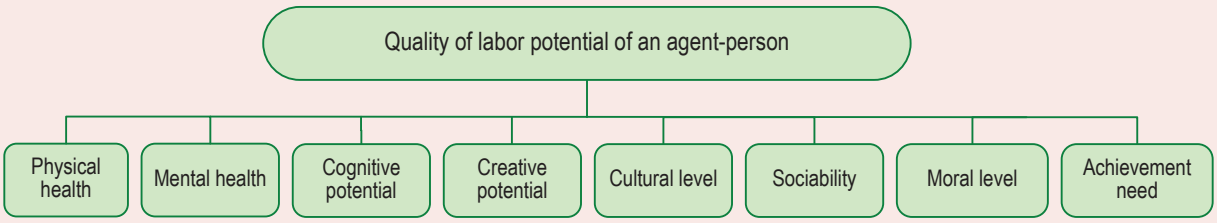
3. the agent-based paradigm of simulation modeling [19].

The main research methods are the following: at the stage of information collection – sociological and statistical methods (questionnaire and database statistical processing); at the stage of conceptual model development – abstraction and generalization; at the stage of computer model construction – agent-based modeling; at the stage of model testing – retrospective forecast and computational experiments; at the stage of work with scientific literature and results interpretation – general scientific methods of work with information (analysis, synthesis, etc.).

The information base of the research consists of Russian and foreign publications on agent-based modeling of socio-economic systems and various aspects of labor potential reproduction, statistical data of the Vologda Oblast Territorial Body of the Federal State Statistics Service (Vologdastat), presented in the annual statistical collections "Labor and employment in the Vologda Oblast", "Age and gender composition of the Vologda Oblast population", "Municipal districts and urban districts of the Vologda Oblast", "Demographic yearbook of the Vologda Oblast", etc., as well as the results of sociological measurements carried out by the Vologda Research Center of the Russian Academy of Sciences in the region, in particular, the data of the regular sociological monitoring[1] of the qualitative state of labor potential in the Vologda Oblast [20], which helps fill the model with reliable and detailed information about quality characteristics of the working age population.

[1] The characteristics of the survey are as follows. The working age population of the Vologda Oblast is a study object. Surveys are held annually in August-September in the cities of Vologda and Cherepovets and in 8 districts of the region (Babaevsky, Velikoustyugsky, Vozhegodsky, Gryazovetsky, Kirillovsky, Nikolsky, Tarnogsky and Sheksninsky). The total sample size is 1,500 people. The sampling method is zoning with proportional location of observation units. The sample type is quota by sex and age. The random sampling error is 3-4% at the 4-5% confidence interval. The survey method is a survey at place of residence of the respondents.

Figure 1. Structure of labor potential quality of an agent-person



The use of the concept of population's qualitative characteristics to describe labor potential of agents-people is a fundamental difference of our approach and allows us to provide a comprehensive quantitative and qualitative reflection of labor potential of a territory in the agent-based model. Based on the results of the monitoring of empirical data, each agent-person in the model is endowed with eight individual qualities: physical and mental health, cognitive and creative potential, sociability, cultural and moral levels and achievement need (Figure 1).

The method of measuring these qualities is based on the use of Likert scales[2] that allow us to identify a degree of respondent's consent with the questionnaire statements grouped into blocks. Each labor potential quality corresponds to a separate set of questions. As a result of quality measurements, a numerical estimate is obtained in the index form. In fact, the index is a ratio of the actual number of points on a particular scale to the maximum possible and is interpreted as follows: the closer the index value to a 1, the better developed the corresponding quality, and vice versa. The physical health index is assessed on the basis of data on the frequency and severity of diseases, supplemented by self-assessment of health. The mental health index is measured by the presence of signs of mental instability. Cognitive potential is calculated on the basis of information about knowledge sources and respondent's attitude to knowledge and education. Creative potential is evaluated on the basis of data on creative activities and attitude to creativity. The communicability index is calculated on the basis of information about the ability to communicate and interact. The cultural level is assessed by external and internal culture of a person. The moral level index is calculated on the basis of data on moral feeling and moral behavior. The level of achievement need development is determined on the basis of information about plans and intentions of a respondent [20]. The measurement method was first tested in 1996 and is still successfully used by the Vologda Research Center of the RAS to monitor the quality of labor potential of the region. In fact, it is the availability of unique data on the quality of labor potential and the behavior of the working age population together with the problem processes growing in the municipalities that prompted us to create an agent-based model for labor potential reproduction at the municipal level. Besides, we should emphasize that the used sociological method is not limited to the measurement of eight basic qualities. With the help of special

[2] Likert scale is a kind of questionnaire of attitudes. Named after the author – R. Likert, who proposed them in 1932, Likert scales consist of a set of statements with five – or seven-point rating scales of evaluation, which establish the degree of interviewee's consent with this statement. A more detailed description of the measurement scale is represented in the work: Ilyin V.A., Smirnova N.A., Timofeeva Ya.B. *Quality of Labor Potential in the Vologda Oblast*. Vologda: VNKTs TsEMI RAN, 1998. 72 p.

formulas [16, 20] we can get aggregated properties of upper levels of the hierarchy and finally calculate a social capacity index – an integral indicator of labor potential quality, the values of which in the territorial context can be found in the article [1]. However, while constructing the model, we deliberately do not use aggregated indicators and consider only the qualities to be directly measured. We want to reflect a labor market more adequately, as in reality an employer puts forward requirements not to labor potential as a whole, but to the level of development of employee's individual qualities.

It is important to note that to test the model, we conducted an in-depth study of labor potential quality in the pilot district, the Velikoustyugsky Municipal District, widely known as the "Father Frost's Homeland" in 2017. This year, 400 people of working age have been interviewed in the district. In addition, in 2018 we organized an official working meeting with representatives of the Velikoustyugsky Municipal District administration to discuss our developments and take into account real needs of the practice.

The basic concept of our agent-based model is as follows. It is believed that the reproduction of labor potential of a municipal formation is determined by the activities of agents of three types: individuals (carriers of labor potential, agents-people), legal entities (employers, agents-firms), municipal authorities. Such a composition of agents is justified not only by the compliance with the real system, but also by the study purpose. Agents-people and agents-firms are present in the model explicitly as separate types of agents. The starting number of agents-people is determined at the rate of one person from each ten. Such a good scale of the model can be achieved due to the small population of the municipality. It is usually necessary to use a larger scale in regional and country-level models: for example, in the agent-based regional model "Governor" the number of agents-people was determined

Table 1. Characteristics of model agents and their behavior

Agent type	Number	Key characteristics	Available actions (behavior)
Physical persons – labor potential carriers ("people")	5,783 agents at the start (one out of every ten at the beginning of 2011))	Gender, age, education, marital status, physical health, mental health, cognitive potential, creative potential, sociability, cultural level, moral level, achievement need, reproductive attitudes, etc.	Get a job, resign, migrate, start a family, have a baby
Legal entities-employers ("firms")	13 agents (each "firm" corresponds to 1 type of economic activity)	Total number of jobs, number of vacancies, average wage, policy in relation to working pensioners	Hire an employee, dismiss an employee, create/close a workplace, change salary
Municipal authorities ("managers')	Present in the model implicitly	Not set explicitly	Behavior is set exogenously by changing controlled parameters of the model
Auxiliary type of agents – workplaces	*Employed jobs+vacant*	*Requirements to labor potential quality (according to 8 criteria), age, education, salary*	*Start/terminate relationship with an employee*
Source: compiled by the author.			

by the modeler as follows: "six agents from each thousand of inhabitants" [12]. "Firms" are considered in aggregate due to available statistical data: each corresponds to one type of economic activity. Thirteen agents-firms are presented as a total. Agents-authorities are present in the model implicitly and form the functioning environment of agents of other types. Their behavior is set exogenously. The key characteristics of different types of model agents and the actions available to them are summarized in *Table 1*. The relations between agents-people and agents-firms are considered in a simplified way: on the part of an employee reduced to the opportunity to get a job and work with a certain level of realization of each labor potential quality or leave it, and on the part of an employer – to hire or fire an employee, change wages. The conceptual model is described in more detail earlier in the article of the same name [13].

The simulated process is adequately reflected in the model due to the fact that its design corresponds to the three-phase structure of labor potential and contains three interrelated and complementary blocks: 1) a block of imitation of labor potential formation (fertility, migration, mortality, formation of qualitative characteristics of the population); 2) a block of imitation of labor potential distribution (labor market and career growth); 3) a block of imitation of labor potential use (production and labor behavior). The main idea of the model is that the processes of the macro level are formed as a result of individual behavior of many heterogeneous agents of the micro level, in particular self-preservation [21], educational [22], migration [23], and reproductive behavior [24].

To simulate agents' behavior, we use a heuristic approach [25], based on information about taken decisions and implemented behavior. The optimization approach is rejected due to a lack of evidence on preference or criterion functions of agents. We support D. Helbing's point of view and believe that agents' behavior and interaction can, of course, be formalized and described by equations, but in a more general and natural way they can be determined by decision-making rules, such as "if-then" rules or logical operations. This makes the model more flexible and makes it easier to reflect individual variations in behavioral rules ("heterogeneity") and random effects ("stochasticity") [10, p.27]. This approach helps to easily visualize operation of the model and provides maximum visibility and easy perception. We fully agree with *A.V. Borshchev* that "all dynamics of the model should be put into visual forms of description, if any, and the code should be left for calculations that do not have time semantics" [26].

The difficulties to perceive too formalized description of models prompted foreign developers to create a universally recognized standard of simple and accessible representation of agent-based models. The group of 28 experts in the field of applied agent-based modeling developed, tested and published the so-called ODD-Protocol [27]. The Protocol consists of three blocks: Overview, Design concepts and Details, with each being divided into smaller elements that need to be briefly described by a developer. The first section describes a purpose and a general idea of creating a model, describes state variables and scales, and provides a process overview. The second section describes design concepts and proposed structural solutions. The third section describes features of initial state setting, input data and submodels. The authors formulate key principles of describing models on the basis of the ODD Protocol as follows: first overview, details later; simplicity

Insert 1. Description of the model based on the abbreviated ODD Protocol

Purpose: modeling labor potential reproduction at the municipal level.
Types of agents: agents-people (explicitly), agents-firms (explicitly), agents-managers (implicitly).
Scale: 1 person in the model – 10 people in reality; 1 firm in the model – 1 type of economic activity in reality; agent-manager – a generalizing representative of all municipal authorities.
Variables: labor potential quality indices, sex, age, type of behavior for each quality, requirements to labor potential quality on the part of employers, number of vacancies, etc.
Main processes: birth rate, mortality, migration, development of quality characteristics, dismissal and employment, creation of new jobs, etc.
Initial state: corresponds to the age and sex composition of population and the distribution of workers in the Velikoustyugsky Municipal District at the beginning of 2011.
Input data are loaded from the database, controlled parameters are set exogenously by "managers" in the course of operation of the model.
Output data: dynamics of the number and structure of labor potential, changes in the indices of labor potential quality of agents-people, their distribution by types of behavior, etc.
Components of the model (submodels): models of formation, distribution, labor potential use.

of description – ease of perception; ease of replication and repetition; independence from discipline, complexity, operating system and programming language. If a model involves elaboration of specific solutions, it is appropriate to use the later developed extended standard: ODD+D (Overview, Design, Details + Decisions) [28]. The ease of the ODD-Protocol use is clearly demonstrated in the monograph of *Hamill L., Gilbert N.*, disclosing 19 author's models. For easy perception and reproduction each model is described on the basis of the abbreviated version of the ODD-Protocol and supplemented by a pseudocode that briefly reveals the work of a model in natural language and helps understand the essence of a model without knowledge of programming languages [29].

In our case the description of the proposed model based on the abbreviated ODD Protocol is presented in *Insert 1*.

Basic methodological assumptions of the model are the following:

1. Reproduction of labor potential of a municipality is formed as a result of activity of three types of agents: residents of the municipal district, employers and municipal authorities. Other agents do not affect the reproduction process.

2. Velikoustyugsky Municipal District as a whole is considered to be agents' place of residence. Agents are not linked to a specific locality due to a lack of spatial data.

3. Quality of labor potential of an agent-person is determined on the basis of the concept of qualitative characteristics of the population and includes only eight basic qualities: physical and mental health, cognitive and creative potential, sociability, cultural and moral levels, achievement need. Other qualitative characteristics are not taken into account.

4. Quality of labor potential of an agent-person in the future depends on the current quality and individual behavior in relation to it, which can be destructive, neutral or constructive.

5. Relative intensity of destructive behavior is considered to be the same for all agents-people and serves as a characteristic of the population. A similar assumption is made for constructive behavior.

6. Authorities can influence reproduction of the quality of labor potential by promoting positive practices, such as healthy lifestyles, and preventing negative phenomena, that is, increasing the population share with a constructive type of behavior in the model and reducing the prevalence of destructive behavior through the use of interactive controls (sliders).

Insert 2. Pseudocode of the model of labor potential reproduction of a municipality

We create an artificial world of the size of 450×550 points for visual expression.
We place agents-people visualized as people there randomly,
Depending on the age of an agent, we paint the figures light green (younger than working age), green (of working age) or yellow-green (older than working age).
At each step of the model we:
- remove agents-people who have died or migrated at this step from the model;
- increase the age of agents by one year;
- add born and arrived agents;
- change agent-person's qualitative characteristics of labor potential in accordance with the current quality and type of behavior;
- create links between an agent-person and an auxiliary agent-work place, when get employed;
- remove links when an agent is dismissed or removed from the model;
- perform other basic procedures to simulate the formation, distribution and use of labor potential.
We collect statistics on agents and display data in the appropriate area of the model view in the form of dynamic graphs.

Results and discussion

The integrated agent-based model of labor potential reproduction at the municipal level is the main and most important result of the work performed. If we stick to the previously developed classification [6], *by the purpose of application* the proposed agent-based model will relate to the models designed to predict risks of socio-economic development and test management impacts; *by the method of authorities inclusion in the model* – to the models containing them in an implicit form; *by the method of setting control actions* – to the models, in which authorities' behavior is determined exogenously, i.e. is set outside the model before or during its operation.

The model is implemented in the simulation system AnyLogic Professional, with Java being the built-in programming language. The Java-code is large and difficult to understand, requires special knowledge in the field of programming and is appropriate for placement and discussion only in the journals specializing in information technology. In publications on economic and social topics, the use of a pseudocode is the most appropriate and useful method of describing a model. The pseudocode of the model of labor potential reproduction of a municipality developed by us is presented in *Insert 2*.

The model is filled with real sociological and statistical data. In this case, the main conditional data in the model selected in the calibration process are: intensity coefficients of destructive and constructive behavior with regard to each basic labor potential quality used in the procedure to simulate the formation and development of labor potential quality[3], as well as the allowable gap between the requirements for job places and quality of employee's labor potential according to eight criteria involved in the labor market imitation procedure.

The simulation model has a user-friendly interface, an intuitive navigation system implemented in the form of links that help a user to navigate among view areas of the model, and interactive controls that allow decision makers to change managed parameters, thereby testing various options for possible solutions and selecting the best ones.

Figure 2 shows a start page of the model with a beautiful view of the city of Veliky Ustyug

[3] The procedure is described in more detail in the article: Chekmareva E. A. Simulation of the population's qualitative characteristics formation in the agent-based model of labor potential reproduction. *Population*, 2018, vol. 21, no. 2, pp. 69-83. DOI: 10.15838 / esc.2018.1.55.11.

Figure 2. Start page of the model

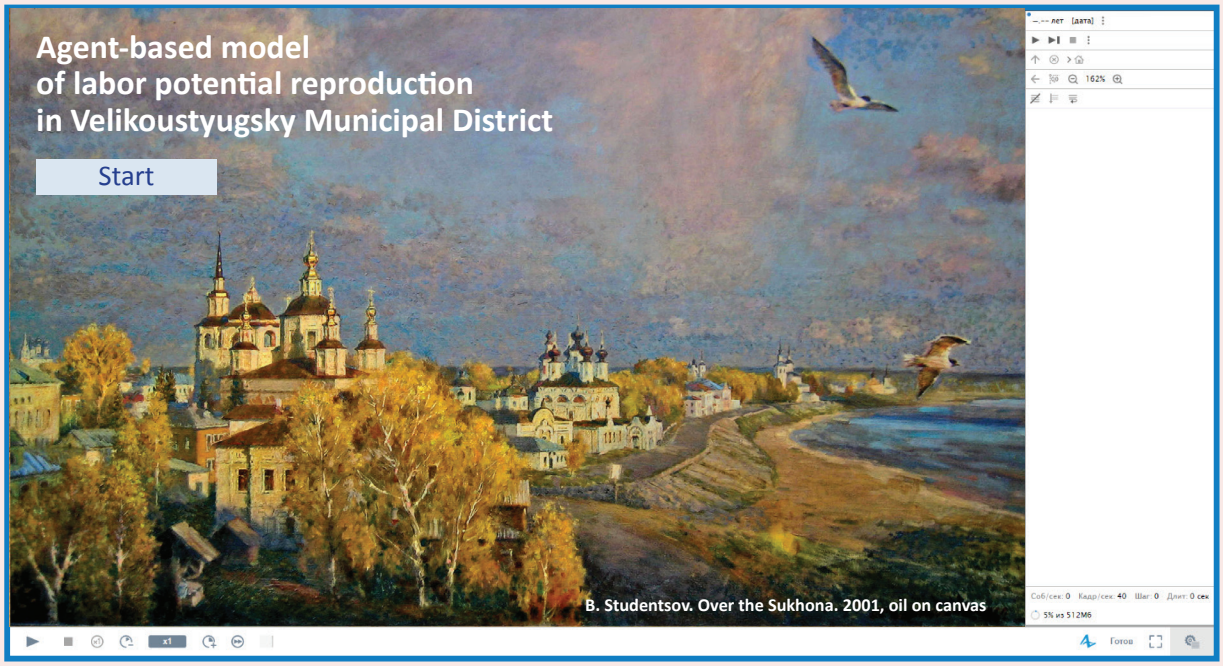


Figure 3. View area of the dynamics of the population structure and number

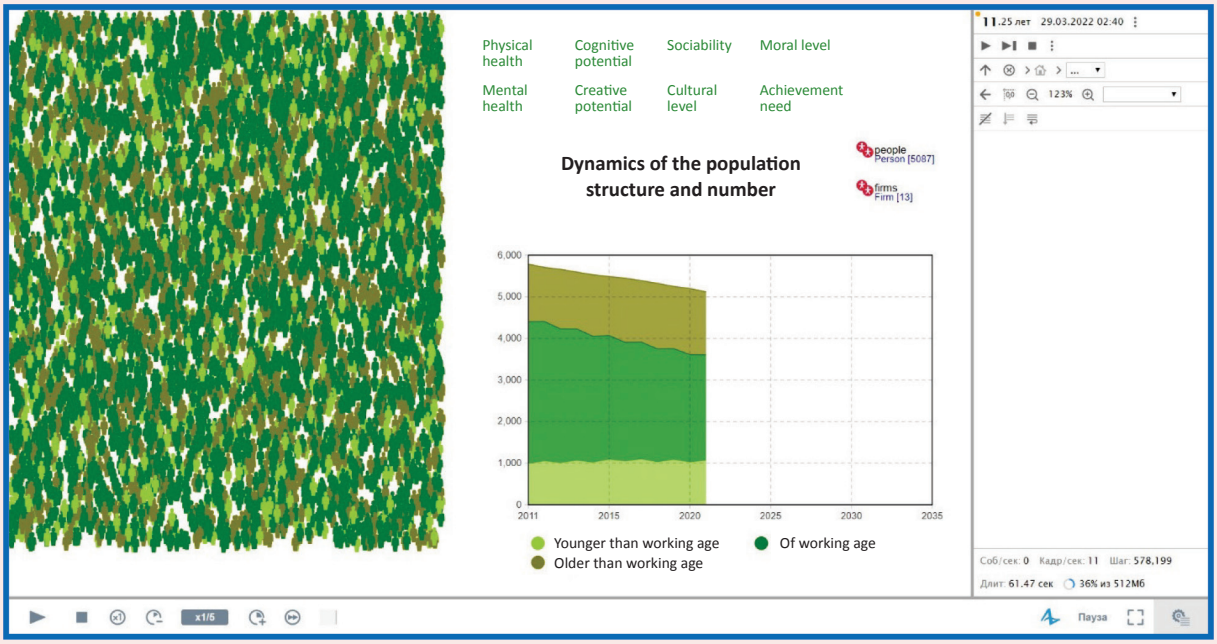
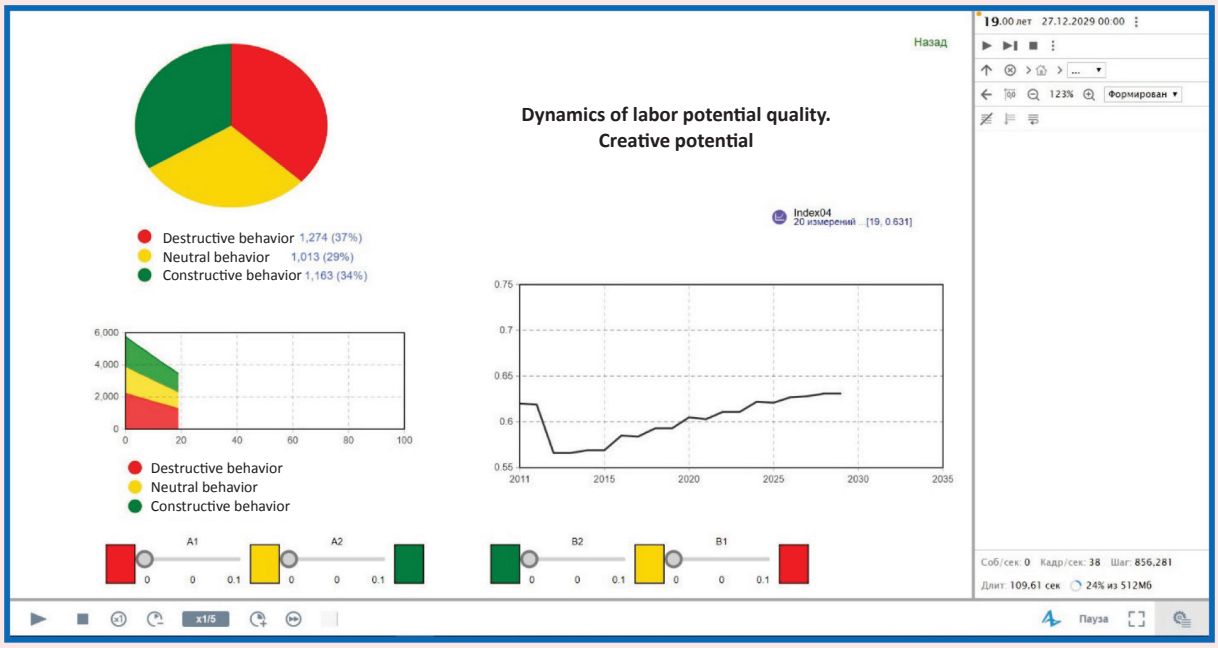


Figure 4. View area of the dynamics of population's creative potential



(B. Studentsov. Over the Sukhona. 2001, oil on canvas), which is the administrative center of the municipal district and where our developments were tested. This is a kind of "cover" of the model.

The view area of the age structure and population (*Fig. 3*) allows a user and modeler to observe the dynamics of population decrease and aging. It reflects data on the current number of agents-people and provides an opportunity to view the dynamics of individual qualitative characteristics of labor potential at the links.

For example, *Figure 4* shows a view area of the dynamics of creative potential. In this case the computational experiment results reflect the change in the index according to the inertial scenario with the stability of existing types of behavior, without transitions between them (coefficients A1, A2, B1 and B2, which determine transition probability and are controlled by "sliders", are zero). As can be seen from the figure, the index failure, recorded at the beginning of the period, will be restored only to 2025. At the same time, if at least 1% of the working-age population with destructive and neutral behavior changes its attitude to creativity for the better (A1=A2=0.01), the index value will recover a year earlier and continue to grow gradually.

The analysis of quality of the model by means of retrospective forecast (*tab. 2*) shows that the deviation of the modeling results from the official data on the total population in 2012–2018 (as of January 1), published in the statistical collections of Vologda Oblast, does not exceed 0.7%. At the same time, the working age population calculated on the basis of the modeling results – the main quantitative indicator of the accumulated labor potential in the region – deviates from the statistical data by no more than 2.4%. The obtained indicators show good quality of the model and its suitability for practical application in order to predict the dynamics of labor potential of

Table 2. Comparison of modeling results with official statistics, as of the beginning of the year (scale 1:10)

Indicator	Year						
	2012	2013	2014	2015	2016	2017	2018
Total population	5,732	5,679	5,631	5,563	5,499	5,462	5,425
Modeling results	5,706	5,659	5,594	5,529	5,486	5,447	5,387
Deviation, %	-0.5%	-0.4%	-0.7%	-0.6%	-0.2%	-0.3%	-0.7%
Working age population	3,271	3,181	3,101	3,007	2,934	2,882	2,824
Modeling results	3,349	3,214	3,159	3,028	2,975	2,852	2,812
Deviation, %	2.4%	1.0%	1.9%	0.7%	1.4%	-1.0%	-0.4%
Sources: Vologdastat data; author's model calculations.							

a municipality. We should pay attention that the official statistics on population is also an assessment carried out by the Federal State Statistics Service of the Russian Federation on the basis of the results of the latter population census and data on its migration, fertility and mortality. Moreover, the imperfection of such a calculation system is evidenced by the need to re-evaluate the data of previous years after each census.

Naturally, the assumptions and suggestions made in the model, as well as the initial data used, impose certain limitations on its applicability. The model is a simplified reflection of reality. This should be understood and taken into account. The main drawback of a current version of the model, which can not yet be eliminated due to limitations of the available information base, is significant conventionality of the data on labor potential quality of the population younger than working age, since only persons of working age fall into the sample of the monitoring of the qualitative state of labor potential of the Vologda Oblast population, carried out by the VolRC RAS. Perhaps, in the future it will be possible to solve this problem. So far, data on the quality of labor potential of the older, "parent" generation are used to set the qualitative characteristics of "children" [13].

The main thing is that we have managed to create a workable tool for analysis and forecasting of labor potential reproduction, reflecting the dynamics of labor potential of a municipality in unity and the relationship of its quantitative and qualitative aspects and helping test management decisions in an artificial society to improve the efficiency and sufficiency of real processes management.

At the moment, theoretical significance of the model is to develop procedures for simulating labor potential reproduction on the basis of the concept of qualitative characteristics of the population and the paradigm of agent-based modeling. As for practical significance of the model, it provides opportunities for testing management actions and conducting computational experiments.

As is known, an agent-based model is a flexible tool that can adjust simulation procedures, adding new types of agents and interactions, changing agents' characteristics when new information appears, etc., almost endlessly perfecting its developments. However, the priority direction for further development of our complex agent-based model of reproduction of labor potential of a municipality is to consider real needs of the practice and upgrade the model, so it can have practical application.

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Mathematical Simulation Modeling of the Income Taxation System with the Use of Tukey's Q-Test*

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Abstract. The study deals with the development of a mathematical simulation models for the income taxation system. The paper uses general scientific research methods (analysis, synthesis), mathematical simulation modeling techniques and substantiation of statistical hypotheses. This comprehensive approach is carried out in two stages; this fact distinguished our present study from previously published works on the subject. Flat personal income tax rate is assumed as a basic condition of the system. An effective system of income taxation should take into account two mandatory conditions. The first condition relates to the budget and consists in the non-reduction of tax revenues of the consolidated budget of the Russian Federation. The second – social – condition is to eliminate excessive social inequality in the first five decile groups of citizens by income. In order to fulfill the first condition, we create a mathematical simulation model, which includes non-taxable minimum and tax deductions. In order to comply with the second condition, we propose to use Tukey's q-test, which allows us to assess the degree of social inequality not only in the extreme deciles, but also in their pairwise comparison. We determine that the social condition can be tested with the use of the least significant differences (LSD). In conclusion, we note that our model can be used in the absence of budget constraints. Besides, we propose further directions to develop the methodology and create a system of differential equations that take into account tax, labor and other legislation.

Key words: mathematical simulation modeling, Tukey's q-test, mathematical model, income taxation, social inequality, flat-rate taxation system, model conditions.

* The article is based on the results of studies carried out at the expense of budget funds under the state order given to the Financial University in 2018.

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1. Introduction. Problem statement.

In the Russian Federation, the basis of income taxation is individual income tax levied on the income of residents (earned from the sources in Russia and abroad) and on the income of non-residents (earned from the sources in Russia) according to a proportional (flat) scale[1]. The basic tax rate is 13%. For comparison: in Austria in the presence of progression it reaches 55%, in Belgium and Israel – 50%, in the Netherlands – 52%, in France, Germany and Greece – 45%. An important element of taxation of citizens is tax deductions that represent the amount of citizens' expenses on socially significant or investment purposes and that reduce the tax base (taxable at the rate of 13%, except dividends).

At first glance, the system of citizens' income taxation seems more fair than in the United States and a number of developed European countries. This position is explained, among other things, by the low share of taxes levied on individuals in GDP (less than 4% in Russia, about 10% in the U.S., from 8 to 10% in the EU). However, a more detailed analysis of the main income tax payers reveals that in Russia the important fiscal role of individual income tax is provided by the income inflows from the first four groups of the population by income (in the context of quintiles). On the contrary, in the United States, according to the Congressional Budget Office, about 80% of income tax revenues falls on the 5th quintile group of the population by income, while the 4th group gives another 14% of tax revenues.

Current tax deductions are provided to all taxpayers regardless of their financial situation. A small exception concerns child rearing deductions (1,400 rubles for the first and second child, 3,000 rubles for a third and each subsequent child), the payment of which stops from the month in which the income of the taxpayer receiving it, calculated on a cumulative basis from the beginning of the year, exceeds 350 thousand rubles. Consistently, throughout the year, this deduction can only be received by the taxpayer, whose average monthly salary does not exceed 29.2 thousand rubles. Thus, the right to such an insignificant tax deduction for the family budget for children is not even available to all taxpayers who receive the average salary, which according to Rosstat amounted to 39,1 thousand rubles in 2017. Simultaneously, those who earn considerably higher wages legally get almost all the statutory deductions (social, financial, and investment).

In order to eliminate the situation described above and to smooth social inequality, the Government has repeatedly introduced draft laws on individual income tax reform. However, most of these proposals are aimed at establishing progressive taxation and are based on individual changes in the procedure for calculating individual income tax. Moreover, in accordance with current instructions of the President of the Russian Federation, progressive taxation for individual income tax will not be introduced in the coming years. In our opinion, this provision is justified, first, due to financial reasons – currently Russia's budget is not ready to adopt progressive taxation, the obligatory element of which in all developed countries is a non-taxable minimum. Second, there are quite a few social risks (an increase in the shadow wage market, job cuts), which can bring to naught all the expected positive fiscal effects of this innovation. Finally, third, the establishment of progressive taxation implies mandatory control over citizens' expenses (taking into account their social status), and to exert such control is not yet feasible in Russia.

[1] In the context of the present study, the concepts of "flat" and "proportional" scale of taxation are used as synonyms.

Otherwise, progressive taxation would further exacerbate the issues of social justice with regard to national income taxation.

Thus, the most effective and promising way to improve individual income taxation is to change the flat taxation scheme both in terms of tax rate and certain elements of individual income tax. The introduction of a non-taxable minimum and the improvement of the system of individual income tax deductions can serve as the tools that can help ensure hidden progression and increase justice in taxation on the basis of redistribution of income of different population groups. The proposed changes should be comprehensive and they should affect the entire system of income taxation and at the same time take into account the interests of all those who participate in tax relations. We find it very relevant to use integrative methods of modeling of this system, in particular with the use of mathematical techniques. M.Yu. Andreev notes that "with the help of models it became possible to understand the internal logic of development of economic processes, the logic hidden behind the visible and often seemingly paradoxical picture of economic phenomena, which did not fit into the known theoretical schemes. An experience of using the models has shown that they serve as a reliable tool for analyzing macroeconomic regularities and for forecasting the implications of macroeconomic decisions, provided that the existing relations are maintained. It can be said that a whole "chronicle" of Russian economic reforms expressed in the language of mathematical models was formed [1].

In this regard, the goal of our study is to develop a mathematical simulation model for flat income taxation; the aim of the model is to reduce social inequality and provide stable inflow of income tax revenues in the budget of the Russian Federation.

2. Literature review.

It should be noted that mathematical modeling tools are widely used in the analysis of taxation of income of individuals. We reviewed scientific literature in this field and identified the most controversial aspects in the application of mathematical methods:

– the ratio of the fiscal burden on capital and labor income as a factor in income tax efficiency [2; 3; 4];

– the impact of progressive taxation on total inflows to the state budget [5];

– evaluation of the shadow income market [6; 7].

A. Petrucci used mathematical modeling to estimate the tax rate depending on the tax system's orientation toward capital and labor income [8]. In particular, he built two models: the first is focused on the taxation of financial capital only, the second – on the taxation of capital and labor income. The use of mathematical modeling allowed Petrucci to determine the optimal ratio of state incentives to the taxation of the corresponding type of individual income, depending on the model selected. However, Petrucci's approach does not make it possible to assess how taxes implement the social function, since the approach does not take into account the internal structure of the population by income. A similar study regarding the correlation between the tax burden on capital and labor income was conducted by Ch. Tran [9], who also concluded that the combination of taxation of capital and labor income provides the greatest fiscal effect for the state.

A significant amount of research is devoted to the use of modeling tools to assess the impact of establishing progressive income taxation. For example, Ching-Chong Lai, Chih-Hsing Liao used a mathematical model to assess the impact of a complex progressive scale on the total

revenues of the state budget [10]. The scientists proved that, using the Ricardo-Barro model that takes into account the future expectations of the population under deferred taxation, it is possible to determine the Pareto efficient income taxation.

An interesting approach to assessing the fairness of taxation is proposed by E.Yu. Liskina [11]. She uses mathematical modeling to show that the effective tax burden on labor is inversely proportional to the income received. At the same time, her methodology is controversial, because she uses the total burden on labor (individual income tax and insurance contributions) as an effective feature of the model, while these taxes in Russia are levied both on the employee and the employer.

R.O. Smirnov applied a game theoretic model (the problem of decision-making under uncertainty), the basis of which had been laid by S.V. Chistyakov [12], to justify the scale of progressive income taxation [13]. The advantage of the author's model is that it takes into account a sufficient condition of the mathematical function (progressive tax rate) and a necessary condition (maximization of budget revenues). At the same time, this model does not allow us to assess the elimination of social inequality, since in fact it is aimed at finding only the upper and lower limits of the income tax scale.

Of particular interest is an innovative approach to assessing the dependence of the number of cases of tax evasion and the degree of social inequality [14]. The authors use a kinetic model described by a set of nonlinear ordinary differential equations and prove that the effect of tax evasion consists in reducing the size of middle classes and increasing the size of poor and rich classes. Yu.V. Sibiryanskaya and M.B. Kondratenko used economic and mathematical modeling to build a model of the tax system for Ukraine; their model contributes to an increase in the tax burden on wealthy citizens and the withdrawal of shadow income in the legal tax field [15]. However, the use of only the "decision-making" package for analysis is debatable, since the construction of the model in MS Excel services is possible only on the actual data. In their study, the authors made several very significant assumptions (for example, the share of the shadow sector), which may question the results of such an analysis. However, given an appropriate statistical validation of the results, this approach can be effective. In this regard, we can mention an interesting study carried out by Yu.B. Melnikov concerning the adequacy of mathematical and econometric models [16]. In particular, in our present work, we used the reference approach, substantiated by Melnikov, to the assessment of social inequality after the adoption of tax novelties.

It is worth noting that, in contrast to the considered methodologies for modeling the functions of taxation, we use a synergetic approach based not only on the mathematical modeling of the necessary condition (non-reduction of budget revenues), but also on the statistical verification of the sufficient condition (reduction of social inequality).

3. Research methodology.

The paper uses general scientific research methods (analysis, synthesis), and mathematical simulation modeling techniques. Special attention is paid to the application of statistical methods for testing hypotheses using Tukey's Q-test. We present an integrated approach consisting in the step-by-step application of mathematical and statistical tools. This is a feature of the present study in contrast to the works previously published in this field.

The methodology of our research is based on theoretical developments in the field of income taxation. In particular, the constructed simulation mathematical model must meet the following conditions:

1. The budget condition consisting in the absence of decrease in tax receipts in the budget of the Russian Federation.

2. The social condition that consists in reduction of social inequality of citizens and their stratification by the level of income. In this aspect, we should note that it is impossible to reduce the existing gap between the extreme income deciles by 15.3 times with the help of taxation tools alone. At the same time, it is quite possible to redistribute citizens' incomes in the first half of deciles by means of fiscal tools.

Previously, we noted that the budget condition is a necessary one. Despite the fact that the debated in the field of income taxation usually boils down to justice, financial stability in the current economic conditions is a priority of national policy *(Tab. 1)*.

The formation of two conditions determines the presence of two stages in the simulation modeling system. A mathematical model is used to fulfill the budget condition, and statistical testing of hypotheses using Tukey's q-test is used to fulfill the social condition.

The use of a mathematical simulation model is justified by the fact that as a result of multiple changes in the parametric characteristics it is possible to predict various options for the development of the income tax system. The advantage of this approach consists in the fact that it makes it possible to apply time simulation to the objects on which real experiments are difficult to perform or impossible to implement in principle [17]. Moreover, new parameters can be added to the simulation model subject to their appropriate economic justification.

The choice of the statistical criterion is justified by economic prerequisites in the content of the category "social inequality". In many literature sources, it is estimated primarily by indicators such as the Gini index [18; 19] and R/P 10% ratio (determined by the differences between the extreme decile groups of citizens by income) [20]. In our opinion, a truly effective governmental policy should be aimed at equalizing incomes for all ten deciles, because the assessment of extreme groups of citizens seems to us not objective enough. Among the set of statistical criteria for substantiating the hypotheses, only Tukey's Q-test helps estimate the equality of values in more than two samples.

Table 1. Key indicators of the consolidated budget of the Russian Federation, billion rubles

Indicator	2014	2015	2016	2017	2017 to 2014, %
Public debt of the Russian Federation (at the end of the year)	10 299	10 952	11 110	11 560	112
State external debt of the Russian Federation (at the end of the year)	3 058	3 644	3 106	2 870	94
State internal debt of the Russian Federation (at the end of the year)	7 241	7 308	8 003	8 690	120
Reserve Fund	3 121	4 426	3 421	913	29
National Welfare Fund	4 388	5 227	4 359	3 753	86
Deficit/surplus of state extra-budgetary funds	-26	-680	-185	44	-172
Deficit/surplus of consolidated budgets of constituent entities of the Russian Federation	-448	-172	-13	-52	12
Federal budget deficit/surplus	-334	-1 955	-2 956	-1 331	399
Source: Own calculations based on data of the Ministry of Finance of Russia. Available at: https://www.minfin.ru/ru/ (accessed: 20.07.2018).					

In particular, with the help of a mathematical model it is possible to determine how our following proposals meet the budget condition:

1. Establishment of a non-taxable minimum income in the Russian Federation at the level of the subsistence minimum for the able-bodied population (regional level), adjusted for the individual income tax rate. It is assumed that the right to use this minimum will be granted only to those citizens whose average income in the previous tax period did not exceed the subsistence minimum twofold [21].

2. Increase in the amount of standard child rearing tax deductions to the amount of the subsistence minimum per child (regional level) with the restriction of the right to use it by taxpayers whose income for the previous tax period did not exceed the annual average.

3. Restriction of the right to apply social deductions for education for taxpayers whose income for the previous tax period exceeded the annual average threefold.

To calculate individual income tax receipts, we used the following data on the basis of our proposals:

– indicators of the forecast of socio-economic development of the Russian Federation for the next financial year and planning period (wage fund), elaborated by the Ministry of Economic Development of the Russian Federation;

– dynamics of the tax base according to Form No. 5-NDFL;

– dynamics of the tax base according to Form No. 7-NDFL;

– dynamics of actual tax revenues according to Form No. 1-NM;

– tax rates, benefits and preferences under Chapter 23 "Individual income tax" of the RF Tax Code and other sources;

– *Regions of Russia. Socio-Economic Indicators. 2017: Statistics Collection.* Rosstat. Moscow, 2017. 1402 p. (age structure of the population; participation in labor force; average annual number of employed; average monthly nominal accrued wages of employees of the organizations; average per capita monetary incomes; structure of people's monetary incomes; population with monetary incomes below the subsistence minimum; consumer expenses on average per capita; number of students enrolled in bachelor's, specialist's, and master's programs; number of students enrolled in training programs for skilled workers and employees).

4. Research results.

4.1. Mathematical equation of the budget condition.

In order to build a proportional income tax scale it is necessary to divide all taxpayers into groups in accordance with the flat tax model we developed earlier (by the size of their income – taking into account the right of one group to use a non-taxable minimum; and by the limitation of the right to receive social and standard tax deductions).

Thus, the set of taxpayers should be divided into the following groups:

1) individuals entitled to a non-taxable minimum;

2) individuals entitled to standard child rearing deductions;

3) individuals entitled to social tax deductions for education;

4) other individuals who receive income at the rate of 13% and who are entitled to other tax deductions (except dividends);

5) individuals receiving income at other tax rates, including dividends at the rate of 13% (the number of groups after the fifth one depends on the number of individual income tax rates).

Let us assume that the number of such groups is m (the number of levels). We distribute these groups in order of increasing the average income of taxpayers in the group (presented above) and give them the corresponding index i = 1; 2; ... m [22].

In accordance with current norms of the Russian tax legislation, all Russian taxpayers can be divided into nine levels: the first four groups by income and by rates – 9%, 13% (dividends), 15%, 30%, 35% (m = 9).

Each group has its own taxable base S_{0i} (1):

$$\sum_{i=1}^{m} S_{0i} = S_0 , \quad (1)$$

in which S_0 is the taxable base determined by current rules.

Under a flat tax scale (flat tax rate n_0), the total individual income tax will be determined as follows (2):

$$C_0 = S_0 \times n_0 = \sum_{i=1}^{m} S_{0i} \times n_0 . \quad (2)$$

Under a proportional tax scale, taking into account our proposals, we introduce the following symbols:

n_i – new tax rates;

q_k^i – number of taxpayers in each group of the constituent entity of the Russian Federation;

k – serial number of the constituent entity of the Russian Federation;

M_k – size of the non-taxable child rearing minimum in the k-th constituent entity of the Russian Federation;

D_k – size of the minimum child rearing subsistence level in the k-th constituent entity of the Russian Federation;

d_k^i – number of child rearing tax deductions received by taxpayers of groups 1 and 2 in the last tax period in the k-th constituent entity of the Russian Federation;

O^k_i – amount of standard tax deductions received by taxpayers of the i-th group in the last tax period in the k-th constituent entity of the Russian Federation;

C^k_i – amount of social tax deductions received by taxpayers of the i-th group in the last tax period in the k-th constituent entity of the Russian Federation.

Changes in property tax deductions are not included in the model due to the high degree of their proposed differentiation.

Thus, when our own changes are applied, we get the following:

1. The amount of tax payments that has not been received by the budget due to the provision of non-taxable minimum for individual income tax in group 1 is defined as $\sum_{k=1}^{k=85} q_k^i \times 12M_k$.

2. The amount of tax payments that has not been received by the budget due to the provision of standard child rearing deductions for individual income tax in groups 1 and 2 is defined as $\sum_{k=1}^{k=85} d_k^i \times 12D_k$.

3. The additional amount of tax payments formed due to the restriction on the right to use standard child rearing deductions is defined as $\sum_{k=1}^{k=85} (O_3^k + O_4^k)$.

4. The additional amount of tax payments formed due to the restriction on the right to use social tax deductions for education is defined as $\sum_{k=1}^{k=85} C_4^k$.

Under the flat taxation scheme (when the proposed changes and n_i rates are adopted), the total inflow of payments from individual income tax will be determined as follows (3):

$$C_1 = \left(S_{01} - \sum_{k=1}^{k=85} q_k^1 \times 12M_k - \sum_{k=1}^{k=85} d_k^1 \times 12D_k\right) \times n_i + \left(S_{02} - \sum_{k=1}^{k=85} d_k^2 \times 12D_k\right) \times n_i + \left(S_{03} + S_{04} + \sum_{i=3}^{i=4} \sum_{k=1}^{k=85} O_i^k + \sum_{k=1}^{k=85} C_4^k\right) \times n_{i+} \sum_{i=5}^{m} S_{1i} \times n_i . \quad (3)$$

Thus, to fulfill the budget condition, the inequation for the simulation mathematical model of flat taxation should have the following form (4):

$$\sum_{i=1}^{m} S_{0i} \times n_0 \le \left(S_{01} - \sum_{k=1}^{k=85} q_k^1 \times 12M_k - \right.$$
$$\sum_{k=1}^{k=85} d_k^1 \times 12D_k \Big) \times n_i + \left(S_{02} - \sum_{k=1}^{k=85} d_k^2 \right.$$
$$\times 12D_k \Big) \times n_i + \left(S_{03} + S_{04} + \sum_{i=3}^{i=4} \sum_{k=1}^{k=85} O_i^k \right. \quad (4)$$
$$\left. + \sum_{k=1}^{k=85} C_4^k \right) \times \; n_{i+} \; \sum_{i=5}^{m} S_{1i} \times n_i.$$

Note. When assessing social inequality in the development of a mathematical model we examine the differences in the autonomous okrugs and oblasts in which they are included separately: for example, Khanty-Mansi Autonomous Okrug – YUGRA, Yamalo-Nenets Autonomous Okrug and the Tyumen Oblast without autonomous okrugs. Thus, the total number of subjects is defined as 85 units.

The mathematical model we developed demonstrates clearly that the proposals to improve the income tax system with the use of a flat tax scale and a system of tax deductions are aimed at simultaneously increasing the actual burden on citizens with incomes above average and reducing the burden for low-income citizens. This is the social condition of the income tax model; in order to substantiate its effectiveness it is necessary to conduct the second stage of the study – a statistical assessment of reliability of the sufficient condition.

4.2. Statistical verification of the social condition

The transition from the current to the proposed model of proportional income taxation is aimed at strengthening the social orientation of the tax by redistributing the tax burden among different groups of the population. The calculation of the social effect in income taxation is an important component of the state tax policy.

As we noted earlier, it is impossible to eliminate the existing income gap between the richest and the poorest citizens with the help of the tax scale. According to rough calculations, taking into account the fact that the R/P 10% ratio in Russia in 2017 was 15.3 and that its normative knowledge does not exceed 10, we conclude that the tax rate for the tenth decile under the simple progressive scale should be at least 45%, which carries significant economic, political and social risks.

In this regard, we consider only the lower five deciles as an estimate of social equalization, in which the stratification can indeed be reduced through the use of tax tools.

It is advisable to use per capita income after taxation broken down by decile groups as the indicators of alignment (indicators of the second stage of the system)

In accordance with the standard, the distribution of the population by decile groups should be as follows *(Tab. 2)*.

Table 2. Normative distribution of population by decile groups*

Indicator	Group number									
	1	2	3	4	5	6	7	8	9	10
Share of the population by decile groups, %	10	10	10	10	10	10	10	10	10	10
Share of income in each decile, %	a	2a	3a	4a	5a	6a	7a	8a	9a	10a
R/P 10% ratio (each decile to 1)	1	2	3	4	5	6	7	8	9	10

* Our findings based on the normative value of R/P 10% ratio (10 = 10 a/a); a – the share of the lower decile in the income structure.
Source: own compilation.

Based on the normative values presented above, at the second stage of verifying whether the model complies with the social condition, it is necessary to determine the compliance (non-compliance) of the actual distribution of average income after tax with its theoretical distribution. To do this, it is advisable to use Tukey's Q-test. It is applicable because the following conditions are true:

1) the size of the population by decile groups is the same: $n_1 = n_2 = ... n_m$;

2) it is possible to set the target values of average per capita income for five lower deciles.

Knowing the actual per capita cash income by decile groups x_1, x_2, x_3, x_4, x_5, we find out that the corresponding averages to be tested for equality, under the standard values of R/P 10% (1, 2, 3, 4, 5) will be: $5x_1$, $5/2x_2$, $5/3x_3$, $5/4x_4$, x_5.

The use of Tukey's Q-test to determine the equality or inequality of the averages is carried out in several stages:

1. Calculation of average income after tax $\bar{X}_1, \bar{X}_2 \ldots \bar{X}_m$ by the formula of arithmetic mean simple for each of the five decile groups.

2. The calculated per capita incomes are ranked in ascending order (they coincide with the decile sequence number) (5):

$$\bar{X}_1, \pi \bar{X}_2 \ \pi \bar{X}_3 \pi \ldots \pi \ \bar{X}_m \ . \qquad (5)$$

3. There are differences (of the first order) between adjacent average per capita incomes (6):

$$\bar{X}_2 - \bar{X}_1 ; \ \ \bar{X}_3 - \bar{X}_2 . \qquad (6)$$

4. Similarly, we define the differences between average per capita incomes arranged in an ordered series skipping one decile (the difference of the second order), two deciles (third order) and three deciles (fourth order) (7):

$$\bar{X}_3 - \bar{X}_1 ; \ \ \bar{X}_4 - \bar{X}_2 . \qquad (7)$$

5. For each value of the difference it is necessary to put forward two hypotheses: zero (H_0) – average per capita incomes by decile groups are equal (the goal of social alignment is achieved); alternative (H_A) – average per capita incomes by decile groups are not equal (the goal of social alignment is not achieved).

6. For each deviation in average per capita incomes (a pair of deciles) an average error (8) is calculated:

$$= \sqrt{\frac{S^2_{hab}}{n_m}} \ , \qquad (8)$$

where S^2_{hab} is the variance within each decile,

n – population size in each decile group.

7. For first-order differences, the actual value of the criterion is found by dividing them by the average sampling error (9):

$$Q_{fact\,(1)} = \frac{\bar{X}_2 - \bar{X}_1}{m}, \ Q_{fact\,(2)} = \frac{\bar{X}_3 - \bar{X}_2}{m} . \qquad (9)$$

The actual values of Tukey's Q-test are compared with the value presented in the Table (the same value for all the first order differences). The value in the Table depends on three characteristics: significance level (it is advisable to set it at the level of 95%), the number of degrees of freedom and the value k=2 for the first order differences. If $Q_{fact} > Q_{table}$, then the alternative hypothesis is accepted (the goal of social alignment is not achieved), otherwise the null hypothesis is accepted.

8. By analogy, the actual value of the criterion for the second, third, and fourth order differences is determined. The only difference is that the coefficient k equal to 3, 4 and 5 (respectively) is used to determine the table value of Tukey's Q-test.

In addition we note that, instead of substantiating the statistical hypotheses, it is possible to determine the elimination of social

inequality in the lower deciles by comparing the pairwise differences in average income with the least significant difference (LSD). In this case, LSD is defined by formula 10:

$$\text{LSD} = Q_{\text{table}} \times m \,. \qquad (10)$$

Where the actual differences are less than or equal to LSD, then excessive social inequality is recognized as eliminated. If the actual differences are greater than LSD, then the income tax model needs to be improved, because it does not meet the social condition.

4.3. Approbation of the mathematical model and verification of its conditions

According to the mathematical model we developed, we determined the volumes of revenues not received by the consolidated budgets of each of the constituent entities of the Russian Federation, which were subsequently used to comply with the budget conditions of the model. The methodology for calculating the revenues that were not received is based on the use of average characteristics, because positive and negative deviations are mutually compensated under this method of calculation.

The following assumptions were used in the assessment:

1. The subsistence minimum for the able-bodied population and for child rearing was used as of the 4th quarter of 2017.

2. The number of employed people with incomes below the subsistence minimum is adjusted to the average Russian indicator – "the share of the population of working age" (56%).

3. When calculating the indicators "Proportion of the population whose per capita income is within the range of one to two non-taxable minimums" and "Proportion of the population whose incomes do not exceed the average accrued monthly wage", the income boundaries are determined on the basis of statistical data on the distribution of the population by income size, taking into account correction factors. These factors are determined with the help of expert method, since the boundaries of the groups do not coincide exactly with the size of the subsistence minimum.

4. The number of individuals actually entitled to standard child rearing deductions is determined under the new rules, taking into account the coefficient of 0.25. The coefficient is determined on the basis of the average actual indicators of the Federal Tax Service statistical reporting in 2016 (every fourth individual receiving the income used child rearing tax deduction – Form No. 5-NDFL).

5. To determine the average number of children in the family in the constituent entity of the Russian Federation, the total fertility rate is used, which shows an average number of children born to one mother during the entire reproductive period (that is, from 15 to 50 years), while maintaining at each age the birth rate of the year for which the indicator is calculated. Its value does not depend on the age composition of the population and characterizes the average birth rate in a given calendar year.

6. The average number of months in which tax deductions were received under the current rules of the RF Tax Code is determined as the quotient of 350,000 rubles (the maximum amount of income for deduction) and the average monthly nominal accrued wage.

7. Statistical data of the Higher School of Economics are used to assess the structure of students (by sources of funding) in order to calculate the contingent of students[2]. In 2016, the share of students studying at the expense of budgets (federal, regional, local budgets)

[2] Gokhberg L.M., Kovaleva G.G., Kovaleva N.V. et al. *Education in Numbers: 2018: Concise Statistics Collection*. Moscow: NIU VShE, 2018. 80 p.

Table 3. Calculating the contingent of recipients of social deductions for education, 2016

Indicator	Average	Decile groups									
		1	2	3	4	5	6	7	8	9	10
Services in the system of higher education per 1 person, thousand rubles	67.7	3.3	11.1	24.9	37.3	86.0	77.2	102.4	123.3	110.6	101.2
Number of people in decile groups, thousand people	146.8	146.8	146.8	146.8	146.8	146.8	146.8	146.8	146.8	146.8	146.8
Expenditure on education in universities, thousand rubles	9943	48	163	365	548	1262	1134	1504	1810	1623	1486
Structure of expenditure on education broken down by decile groups, %	100.0	0.5	1.6	3.7	5.5	12.7	11.4	15.1	18.2	16.3	14.9
Source: own compilation based on Rosstat data.											

Table 4. Calculating the amount of shortfall in the revenues to be recovered

No.	Type of income	Sum, thousand rubles
1.	Total amount of shortfall in budget revenues caused by the provision of non-taxable minimum income, thousand rubles	591 268 463
2.	Amount of shortfall in tax revenues caused by the increase in standard child rearing deductions, thousand rubles	300 863 887
3.	Notional amount of tax deductions on the 1st, 2nd and subsequent children, thousand rubles	10 886 584
4.	Amount of additional budget revenues due to the imposed restrictions on social tax deductions, thousand rubles	9 509 508
5.	Total amount of additional shortfall in budget revenues, thousand rubles (1+2-3-4)	871 736 258
Source: own calculation.		

amounted to 47.4% of the total number of students. Based on this share, the number of students enrolled on a contract basis is determined.

When calculating the number of recipients of deductions for education, we use the average share of expenditures on education for 9–10 decile groups of the population by income. The indicator is determined on the basis of the data of sample surveys of household budgets[3] *(Tab. 3)*.

Thus, the share of tax deductions that were previously received by taxpayers of two higher decile groups (conditionally – with incomes above three average levels) is 31.2%.

Table 4 presents the resulting shortfall in budget revenues ($\sum SFR_{REF}$).

The aggregate assessment for the Russian Federation has showed that if the changes we propose are implemented, then the amount of shortfall in the revenues of the consolidated budget of the Russian Federation will be about 871.7 billion rubles.

The research needs to be continued in order to determine how much the basic rate of individual income tax should be raised in order to compensate for the specified amount of the shortfall in revenues (ΔHC), that is, to perform the fiscal condition of the model (11):

$$\Delta HC = \frac{\sum SFR_{REF}}{\sum_{i=1}^{m} S_{0i} \times n_0} = \quad (11)$$

$$= \frac{871\,736\,257\,752}{31\,751\,561\,775\,600} \times 100 = 2.7 \text{ p. p.}$$

Since the calculation of the additional rate took into account only the average monthly nominal accrued wage, that is, labor income of

[3] www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/population/level/

Table 5. Calculating transformed variables to determine Tukey's Q-test

Income group	Group's share in the total cash income of the population, %	Average per capita cash income, rubles per month	Average per capita cash income after the introduction of amendments to the legislation, rubles per month	Calculation of transformed variables	Transformed values of average per capita income for the purpose of calculating Tukey's Q-test, rubles per month
First	1.9	5 983	6 877 (x_1)	$5x_1$	34 385
Second	3.4	10 368	11 668 (x_2)	$5/2 \cdot x_2$	29 170
Third	4.5	13 704	15 004 (x_3)	$5/3 \cdot x_3$	25 007
Fourth	5.6	17 107	18 407 (x_4)	$5/4 \cdot x_4$	23 009
Fifth	6.8	20 875	22 175 (x_5)	$5/5 \cdot x_5$	22 175
Source: own calculations.					

Table 6. Actual and tabular values of Tukey's Q-test

Differences of mean values		Value of the difference, rubles	Value of Tukey's Q-test	
			Actual	Tabular
First order	x_1-x_2	5 215	2.069	3.261
	x_2-x_3	4 163	1.652	
	x_3-x_4	1 998	0.793	
	x_4-x_5	834	0.331	
Second order	x_1-x_3	9 378	3.722	4.041
	x_2-x_4	6 161	2.445	
	x_3-x_5	2 832	1.124	
Third order	x_1-x_4	11 376	4.514	4.529
	x_2-x_5	6 995	2.776	
Fourth order	x_1-x_5	12 210	4.845	4.886
Source: own calculation.				

citizens, we believe it is possible to increase the base rate of individual income tax by 2 p.p. rather than by 2.7 p.p. According to the data as of 2016, other income taxed at the base rate and declared by taxpayers amounted to five trillion rubles. Taking into account the average inflation rate (5.88% – 2018 to 2016), the taxes from the base of 5.3 trillion rubles will be additionally received.

Next, let us determine the feasibility of an additional increase in the tax rate to ensure the growth of revenues, taking into account the purchasing power of the population. To do this, we check the following inequation (12):

$$\begin{aligned} 36709.2 \times 105.88 \times (1 - 0.13 - 0.02) \geq \\ \geq 1.5 \times 16087.92 \times 105.88 \\ 33037.55 \geq 25550.83. \end{aligned} \quad (12)$$

With an increase in the base tax rate on individual income by 2 p.p. (up to 15%), it is possible to use our proposals in terms of tax deductions and non-taxable minimum while complying with the budget conditions (non-reduction of inflow of revenues to the budgets). However, for individual constituent entities of the Russian Federation the reduction of income is possible (due to the low level of remuneration), which is necessary to compensate for by providing grants for equalization of budgetary security.

Next, we assess the model with respect to the implementation of the social condition *(Tab. 5)*.

Let us calculate the average sampling error based on the residual variance of the feature, which is conditioned by random factors[4] (13).

$$m = \sqrt{\frac{S_{res}^2}{n}} = \sqrt{\frac{931442005166400}{146674541}} = 2520\,rub. \quad (13)$$

To prove the hypothesis, we calculate the actual values of Tukey's Q-test *(Tab. 6)*.

Zero hypotheses about the equality of averages for all pairs should be accepted, since the actual values of Tukey's Q-test are lower than the corresponding critical values. With a probability of error in five cases out of 100, it can be argued that the average values of income in terms of their optimal distribution do not differ significantly by decile groups. Consequently, the goal of income equalization in the lower deciles has been achieved.

5. Conclusions.

Scientific novelty of our research consists in the development of a new proportionate model for income taxation of individuals, the model contains elements of a hidden progression (non-taxable minimum, the improved system of individual income tax deductions).

Our approach to modeling based on the synergy of mathematical and statistical methods is of theoretical significance. The advantage of our methodology consists in the fact that, unlike the majority of existing approaches to assessing the impact on social inequality through the income ratio in extreme deciles, it makes it possible to estimate the degree of population stratification for each pair of deciles separately. In case of finding a strong degree of stratification only for individual deciles, the government has the opportunity to develop targeted tax incentives (or other individual incentive tools) for a certain group of citizens.

Moreover, the methodology we developed can be used in the absence of budget constraints. In this case, the mathematical model must be transformed by changing the right side of equation (4) to the target (expected) value of tax revenues from individual income tax (C_p). However, in such a situation, an expert assessment of expected revenues is required, which introduces an anthropogenic factor in the model that distorts the actual statistical assessment of income taxation parameters.

Practical significance of the results of our study lies in the fact that the Ministry of Finance of the Russian Federation can use the materials and generalizations contained in the research for the purposes of improving the system of income taxation of citizens. The Federal Tax Service can use our research for the purposes of tax planning and forecasting the amount of tax deductions; the Ministry of Economic Development of the Russian Federation – for assessing the cumulative financial implications and the shortfall in the revenues of budgets within the budget system of the Russian Federation.

The use of mathematical modeling as a tool to substantiate a fair system of income taxation is most reasonable from the point of view of assessing all the conditions laid down in the tax reform (mandatory, sufficient, necessary). However, it is not appropriate to use such models to determine the inflow of revenues from individual income tax for a long-term period. Separation from economic theory is the main disadvantage of modeling, since any socio-economic system in it is represented only by a mathematical expression. It does not take into account changes in the global environment, political changes, and changes in legislation.

[4] Due to the lack of actual data, we calculated residual variance on the basis of the data on average per capita income in constituent entities of the Russian Federation, weighted by the population for each of the entities.

As we noted earlier, taxes are not a panacea for social inequality; fiscal regulation alone is not enough to solve such an important national economic problem. In this aspect, the evolution of our study may consist in the creation of a whole system of equations, taking into account both tax and other types of legislation – labor, social, credit.

Taking into account that it is rather problematic to set all constraints in the form of a mathematical function (in contrast to the fiscal constraint used in our model), we find it advisable to develop a homogeneous system of differential equations, where the constraints will be formulated in the form of limits of some functions.

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Applying the Index Method in the Research on Consumer Sentiment

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Abstract. The index method is an effective tool to study and assess consumer sentiment in the given territory by calculating the aggregated consumer sentiment indices based on sociological data. Our paper discusses methodological approaches used in international practice to measure and evaluate consumer sentiment with the help of integrated indices; we also consider trends in the consumer sentiment index of residents of Russia and the Vologda Oblast. Using multiple regression analysis, we investigate the impact of macroeconomic indicators on consumer sentiment. The information base of the research is presented by the results of the public opinion monitoring conducted by Vologda Research Center of RAS (VolRC RAS), all-Russian analytical centers (Levada-Center, International Institute for Marketing and Social Research GfK Rus), as well as by the data of the Federal State Statistics Service (Rosstat) and the territorial office of the Federal State Statistics Service for the Vologda Oblast (Vologdastat). The basis of various methods used in the world practice to study consumer sentiment is formed by a technique developed in the 1950s by the Survey Research Center at the University of Michigan Institute for Social

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Research (USA). The technique involves constructing an aggregate consumer sentiment index and has become widespread in Russia; RAS Vologda Research Center has extensive experience in regional studies of consumer attitudes and behavior based on sociological data. The results of its regional monitoring largely correlate with the all-Russian indicators, but the consumer sentiment of the Vologda Oblast residents during the measurement period is less favorable than in Russia as a whole. At the same time, long-term forecasts for development of the Russian economy look more optimistic than the estimates of the current state and short-term prospects. Such macroeconomic indicators as the turnover of retail trade of food and non-food products, the dynamics of industrial production, the consumer price index and people's monetary incomes have a significant impact on the formation of consumer sentiment in the region. In general, the use of the indices in the studies of consumer behavior provides a rare opportunity to take into account psychological factors in the modeling and forecasting of the economy, which allows us to detect trends of the socio-economic situation in time and, on this basis, to make adjustments to the management of economic processes.

Key words: consumer sentiment, index, autoregressive distributed lag model, socio-economic development, income, retail trade turnover.

Introduction

Consumers play an extremely important role in the modern market economy, because the expenditures they undertake account for more than half of Russia's gross domestic product. The expenditure indicator, which determines the level of demand for the goods and services produced, largely characterizes the overall economic dynamics in the country (correlation coefficient between the dynamics of household consumption and GDP in 1995–2017 is 0.98). According to the Center for Macroeconomic Analysis and Short-Term Forecasting, the contribution of household consumption to economic growth in the third quarter of 2017 was 2.6% (for comparison: contribution of gross fixed capital formation was +0.8%, changes in reserves were +0.5%, changes in exports were +1.1%, changes in imports were -3.4%, total GDP growth was +1.8%, changes in other components were +0.1%;)[1]. Timely information on consumer spending is required for assessing and forecasting overall economic activity. The presence of effective demand is one of the main factors in the planning of activities at enterprises, in making decisions on increasing or reducing capacity utilization, and in the implementation of investment projects. The establishment of optimal proportions between consumer demand and supply is an important condition for the well-being, stability and economic security of the territory [1].

The decisions of consumers to make certain purchases (especially large ones) or to form savings depend not only on objective reasons, such as the level of personal income and prices in the consumer market. The impact of these factors on the behavior of people in the modern economy is inevitably mediated by their attitudes and subjective views, i.e. perceptions, estimates and expectations about their financial situation, employment, price dynamics, and general economic prospects of the country as a whole [2].

In world practice, consumer sentiment surveys are conducted on a regular basis in more than 40 countries. Most studies use the index method, which involves the construction of

[1] On the development of the Russian economy in 2017. Available at: http://www.forecast.ru/ (accessed: 15.05.2018).

indices, which are aggregated quantitative indicators that summarize the primary sociological information obtained during the measurement using one or more scales. Sociological indices, on the one hand, are a way of aggregation and compression of information and its presentation in a form convenient for description and interpretation; on the other hand, it is a way of transition from the theoretical to the empirical level of research, a way of constructing an empirical indicator of a theoretical concept [3].

Extent of scientific development of the topic under consideration

Domestic and foreign scientists pay enough attention to the development of the topic. The research is carried out in several directions:

1. Studying methodological issues of sociological information processing through the construction and use of analytical indices. Such issues were covered by R. Pinto, M. Grawitz [4], E. Noelle [5], P. Suppes, J.L. Zinnes [6], J. Pfantzagl [7], Yu.N. Tolstova [8], I.F. Devyatko [9], G.G. Tatarova [3], M.S. Kosolapov, V.D. Patrushev [10], G.V. Osipov, E.P. Andreev [11], M.K. Gorshkov, F.E. Sheregi [12], K.G. Gerasimova, V.I. Paniotto, T.I. Zaslavskaya, I.B. Muchnik [13] and others.

2. Constructing and calculating sociological indices on the example of solving specific applied problems and assessing various aspects of life. These problems are considered in the works of N.E. Tikhonova, N.M. Davydova, I.P. Popova [14], P.I. Mtiulishvili [15], M.D. Krasilnikova [16], S.G. Klimova, E.G. Galitskaya, E.B. Galitsky [17], I.N. Dementieva [18].

3. Applying the index approach to the study of consumer attitudes. The foundations of this direction were laid in the 1950s by the American scientist George Katona [19; 20]. Currently, these issues are addressed by such researchers as A. Birman, R. Curtin [21], C.F. Camerer, G. Loewenstein et al. [22], E.-M. Sent [23], E. Franchak, S. Navotny, E. Gusva-Lesni, D. Ibragimova, S. Nikolaenko [24], R. Kapelyushnikov [25], M. Krasilnikova, V. Cherednichenko [26], etc.

4. Using the index approach by various Russian and international research institutions: VTsIOM, FOM, Levada-Center, VolRC RAS, international companies like GfK Group, Nielsen, etc.

In general, despite the comprehensive elaboration of the possibilities of using the index method in foreign and domestic science and practice, there is not enough research on the issues concerning the use of the index approach to study consumer attitudes, and, in particular at the regional level.

Goal and objectives of the study

The **goal** of the present research is to analyze the possibility of using the index method as a tool to study consumer sentiment.

Achieving this goal involves addressing the following **objectives**:

1. Review of Russian and international methods for assessing consumer sentiment with the help of integral indices.

2. Analysis and comparison of trends in the aggregate consumer sentiment index (CSI) of residents of Russia and the Vologda Oblast and the characteristics of private components of CSI for the period from 2000 to 2017.

3. Study of the impact of macroeconomic indicators on consumer sentiment using multiple regression analysis.

Information and empirical base of the research consists of the following sources:

1. Official data of the statistical office of the European Union (Eurostat), the Federal State Statistics Service (Rosstat) and the territorial office of the Federal State Statistics Service in the Vologda Oblast (Vologda Oblast).

2. Data of sociological research conducted by Yuri Levada's All-Russian Research Center (Levada-Center), the International Institute of Marketing and Social Research GfK Rus.

3. Findings of the VolRC RAS monitoring of the economic situation and social well-being of the Vologda Oblast residents.

Research methodology and technique

1. In our research we study consumer attitudes of the Vologda Oblast residents with the help of the *method of monitoring research* of public opinion used by RAS Vologda Research Center. Every two months (six times per year), 1,500 residents over 18 years of age take part in the survey in two cities (Vologda, Cherepovets) and in eight districts of the Oblast (Babaevsky, Velikoustyugsky, Vozhegodsky, Gryazovetsky, Kirillovsky, Nikolsky, Tarnogsky and Sheksninsky)[2]. The main method of monitoring is a questionnaire survey at the place of residence. The method allows us to obtain reliable results of the study primarily by creating convenient conditions for interviewers and respondents engaged in direct interaction. The volume of the sample of the study is about nine thousand inhabitants of the region per year.

2. We use the *index method* for processing social data and for analyzing consumer sentiment of the region's population. On the basis of the data of the monitoring, we calculate the integrated consumer sentiment index and its constituent private indices according to a methodology developed at the University of Michigan Institute for Social Research (USA).

3. We use *econometric methods, namely, the autoregressive distributed lag model and correlation analysis* for a more in-depth analysis of the survey data and statistics in order to determine the impact of macroeconomic factors on consumer sentiment.

Research findings

International and national experience in measuring consumer sentiment with the use of integral indices

We have conducted a review of world's methodological approaches to the assessment of consumer sentiment using integrated indices and combine these approaches into *three groups*.

1. The first group is based on a methodology developed in the 1950s by the Survey Research Center at the University of Michigan Institute for Social Research (USA); the methodology involves the construction of an aggregate consumer sentiment index[3].

The index of consumer sentiment is a multicomponent and highly aggregated indicator. It is constructed as a set of subjective assessments of the current personal financial situation, the situation in the consumer market and the expectations of changes in personal financial situation and in the general economic situation. The specific feature of the consumer sentiment index, which distinguishes it from traditional indicators of socio-economic development, is the use of a specially developed methodology, which is at the junction of sociology, economics and psychology and which includes their latest developments [27].

In the US, CSI was originally measured three times a year; surveys were conducted quarterly since 1960, now they are conducted monthly. Since 1955, the results of measu-

[2] Representativeness of the sample is ensured by meeting the following conditions: proportion between urban and rural population; proportion between the inhabitants of settlements of different types (rural settlements, small and medium-sized towns); sex and age structure of the adult population of the Oblast. The survey is conducted in the form of questionnaire survey at the place of residence of the respondents. Sampling error does not exceed 3%.

[3] The University of Michigan Consumer Sentiment Index. Available at: http://www.fxteam.ru/forex-library/fundamental-analyse/uom_consumer_sentiment/ (accessed: 25.04.2018).

Table 1. Questions used to calculate CSI

No.	Index	Question wording
1.	Index of current personal financial situation	How would you assess the financial situation of your family: is it better or worse than it was a year ago?
2.	Index of personal financial situation prospects	Do you think that in a year your financial situation will be better or worse or about the same as it is now?
3.	Index of short-term development prospects for the country's economy	Do you think in the next 12 months will be a good or a bad time for the country's economy, or they will bring something else?
4.	Index of long-term development prospects for the country's economy	If we talk about the next five years, then do you think they will be a good or bad time for the country's economy?
5.	Index of expediency of purchasing durable goods	If we talk about large purchases for the home, what do you think, is it a good or bad time to buy most of these goods now?

rements are regularly published along with the main macroeconomic statistics of the United States[4].

In Russia, the first measurements of the consumer sentiment index were conducted in 1993 by the Russian Public Opinion Research Center (VTsIOM). At first, they were carried out randomly and irregularly. In 1997, a special non-profit organization, the "Promotion of the development and construction of the consumer sentiment index" Fund (CSI Fund), was established; its main purpose was to assist in providing financial, technical and intellectual support to research aimed at studying consumer sentiment in Russia. In 1996–1997 the CSI project was financed by U.S. Treasury's Office of Technical Assistance, in 1998–2003 – by the grants received from the Ford Foundation and from the sources related to the Russian business community (in particular, from the Moscow Interbank Currency exchange, Sberbank of Russia, etc.), as well as with the support from the CSI Development Center; in 2004–2005, the implementation of the CSI program was supported by the Independent Institute for Social Policy, Levada-Center and Sberbank of Russia [26].

The Institute of Marketing and Social Research GfK Rus – a subsidiary of the largest international research concern GfK Group, which has been monitoring consumer behavior and social attitudes in Russia for more than 15 years on the basis of the all-Russian omnibus research, – makes a significant contribution to the study of CSI, not only on a national scale, but also in the context of federal districts[5].

The technique for calculating CSI is based on the data of public opinion polls on five questions *(Tab. 1)*. Private indices are calculated for each question[6]. The arithmetic mean of the private indices gives the aggregate value – the index of consumer sentiment.

2. The second group of methods is based on the methodology of the European Union for the calculation of the consumer confidence index (CCI). Since 1990, this indicator is calculated monthly in Belgium, France, Denmark, UK, Italy, Germany, Greece, The Netherlands, Ireland, Portugal and other EU countries; it is calculated according to a

[4] Consumer sentiment index. Methodology for analyzing consumer sentiment. Available at: http://www. socpol. ru/research_projects/ipn/methodology.shtml (accessed: 25.04.2018).

[5] Surveys are conducted monthly. The sample is multistage, stratified, representing the entire population of Russia at the age of 16 and older. Sample size is not less than 2,100 interviews

[6] To calculate partial indices, the percentage of positive responses is subtracted from the percentage of negative responses, then 100 is added to the obtained value, so as there are no negative values. Thus, completely negative answers would give a general index 0, completely positive – 200, the balance of the former and the latter would give the index 100, which is, in fact, a neutral mark.

Table 2. Questions used to calculate CCI

No.	Index	Question wording
1.	Index of expected changes in the personal financial situation	Do you expect the financial situation of your household to change over the next 12 months?
2.	Index of expected changes in the economic situation in the country	Do you expect the overall economic situation in the country to develop over the next 12 months?
3.	Index of expected changes in the labor market	Do you expect the number of unemployed in the country to change over the next 12 months?
4.	Index of expected changes in personal savings	Will you save money in the next 12 months?

common methodology that combines the answers in points to four questions regarding the expected changes in (1) personal material and (2) general economic situation, (3) employment and (4) personal savings for the next 12 months. Partial indices are calculated as a balance of the shares of positive and negative answers with half the weight of the intermediate answers, i.e. the indices vary from −100 to +100. The general index is an arithmetic mean of the individual indices *(Tab. 2)*. [28].

Currently, the European Commission has harmonized the consumer confidence index for the main EU countries. The harmonized index is calculated on the basis of confidence indices calculated in the countries by their own services and organizations.

3. The third group includes other techniques, among which we can name the technique of Shinjo Center in Japan, the consumer confidence index (CCI) calculated in the U.S. (Conference Board), in Canada (Conference Board / Canada), in Russia (Rosstat)[7].

For example, the consumer confidence index is calculated by Rosstat (previously – Goskomstat) since 1998 on the basis of the survey of consumer expectations (OPON) once a quarter. The general consumer confidence index is calculated as an arithmetic mean of five private indices (actual and expected changes in personal financial situation, economic situation in Russia, favorable conditions for large purchases) *(Tab. 3)*[8].

Since 2005, Nielsen international research company conducts the Global Consumer Confidence Survey, which reflects the level of consumer confidence, the main factors affecting this level and the willingness of consumers to spend their money. The study covers more than 27 thousand Internet users from 55 countries, including Russia, Asia-Pacific region, Europe, Latin and North America, Middle East, and Africa. Nielsen's consumer confidence index is based on the level of consumer confidence in the labor market, the state of their personal finances, and their willingness to spend money. The level of consumer confidence below and above 100 points is an indicator of the degree of consumer pessimism and optimism for each country. The sample is broken down by age and sex quotas for each country and weighted to achieve the representativeness of Internet consumers[9].

[7] *The Conference Board Consumer Confidence Index.* Available at: https://www.conference-board.org/data/consumerconfidence.cfm (accessed: 13.11.2018).

[8] Private indices are calculated on the basis of the balance of respondents' assessments (percentage) on the relevant question of the questionnaire. The balance of estimates is the difference between the sum of the shares (percentage) of definitely positive answers and ½ of the number of rather positive answers and the sum of the shares (percentage) of definitely negative answers and ½ of the number of rather negative answers. Neutral answers are not taken into account.

[9] Nielsen's Global Consumer Confidence Trend Tracker. Available at: https://www.nielsen.com/consumerconfidence (accessed: 11.10.2018).

Table 3. Questions used to calculate CCI

No.	Index	Question wording
1.	Index of expected changes in the economic situation in Russia in a year	How would you assess possible changes in the Russian economy over the next 12 months?
2.	Index of changes in the Russian economy	How would you assess the changes that happened in the economic situation in Russia?
3.	Index of expected changes in personal financial situation in a year	How would you assess possible changes in your financial situation over the next 12 months?
4.	Index of actual changes in personal financial situation	How would you assess the changes in your financial situation during the year?
5.	Index of favorable conditions for major purchases	How would you assess the conditions for making major purchases?

In general, all the above mentioned techniques for studying consumer sentiment differ in the list of questions included in the questionnaire and used to determine the summary indices; besides, they use different algorithms for weighing the answers of respondents and have different quantitative boundaries of changes in the indices obtained. At the same time, the methodological basis for the study of intentions, attitudes and behavior of consumers using sociological data and carried out by various national and international research institutions was laid in the methodology of the University of Michigan for the calculation of the consumer sentiment index.

On that basis, the technique was adopted and since the late 1990s has been successfully used by RAS Vologda Research Center to study consumer sentiment in the monitoring of public opinion on the territory of the Vologda Oblast. An important role in choosing the methodological approach was played by the fact of long-term regular measurements carried out by the autonomous non-profit organization "Yuri Levada Analytical Center" on a national scale, which makes it possible to compare regional and national trends using a comparable methodology.

Main trends in consumer sentiment in Russia and the Vologda Oblast

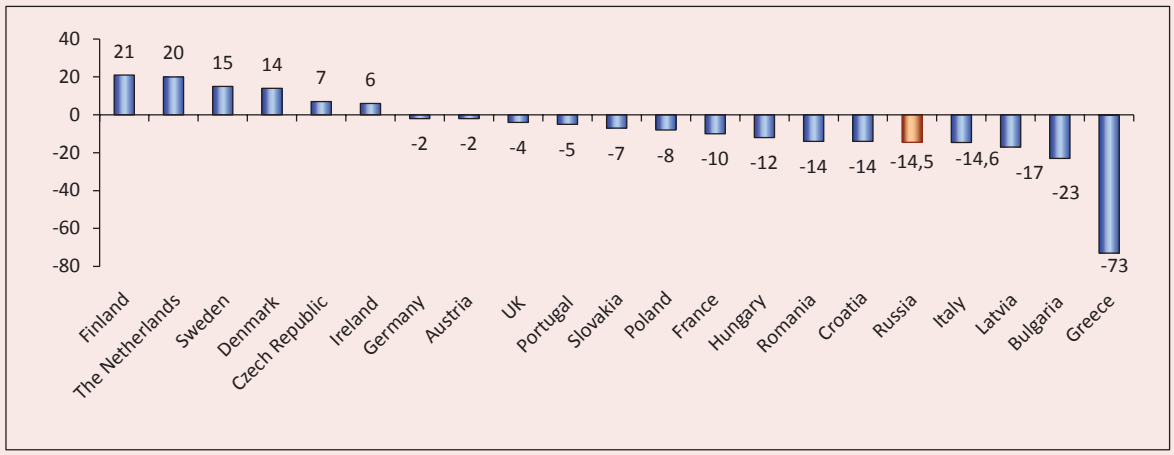
Let us consider the specific results and characteristics of the main trends in consumer sentiment in Russia and the Vologda Oblast.

In 2017, according to Eurostat and Rosstat, Russia ranked fifth from the bottom in the rating among the European countries conducting surveys of consumer sentiment on a comparable methodology. Below Russia in the rating there were countries with traditionally prevailing pessimistic sentiments – Greece and Bulgaria, as well as Latvia and Italy. The most favorable countries to live in are Finland, The Netherlands, Sweden and Denmark; these countries have developed an effective system of social support and have high investments in human capital *(Fig. 1)*.

According to the International Institute of Marketing and Social Research GfK Rus, which calculates the consumer sentiment index according to the method of the University of Michigan, for the period from 2008 to 2017, both in Russia as a whole and in all federal districts there were similar trends in the change of CSI. Its significant decline was noted in the context of the 2008–2009 global financial crisis and the 2014–2015 structural crisis *(Tab. 4)*. In 2017, the consumer sentiment index in all macro-regions of Russia, except for the Far Eastern and Northwestern federal districts, exceeded 100 points[10].

[10] The time of great expectations. Available at: http://www.gfk.com/ru/insaity/press-release/vremja-bolshikh-nadezhd/ (accessed: 26.10.2018)

Figure 1. Consumer confidence index in Russia and in some EU countries in 2017, points



Source: Russia – Federal State Statistics Service data. Available at: http://www.gks.ru; EU countries – Eurostat data. Available at: https://ec.europa.eu/eurostat/

Table 4. Consumer sentiment index in macroregions of Russia, points

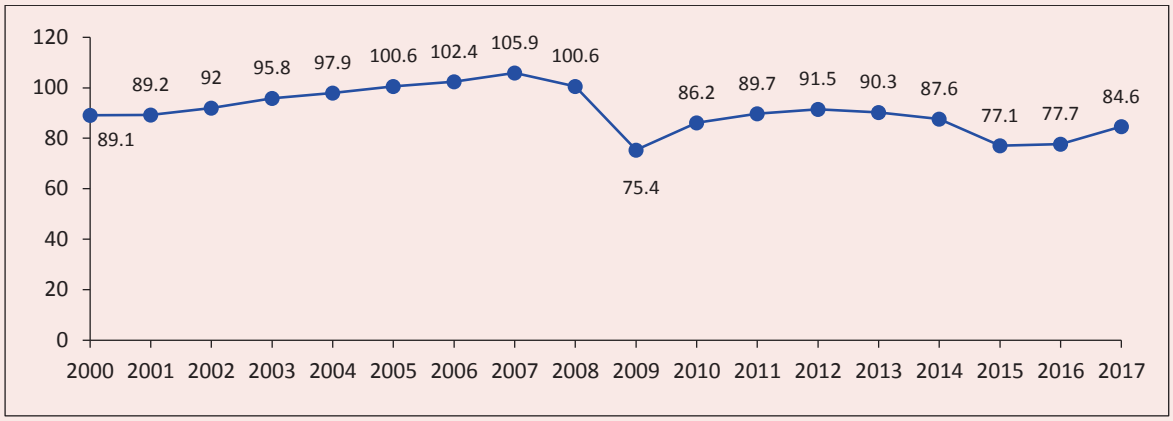
Macroregion	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Russia (as a whole)	**85**	**91**	**106**	**107**	**113**	**113**	**95**	**84.5**	**83.4**	**103.2**
Northwestern	83	100	106	122	113	106	109	73.3	78.6	98.8
Central	81	88	96	95	111	109	92	88.5	84.8	107.4
Southern	74	90	106	96	116	108	105	81.8	78.4	104.4
Volga	81	85	103	102	110	113	99	85.3	83.4	105.2
Ural	71	94	107	118	117	121	108	92.0	85.8	108.0
Siberian	83	97	105	110	119	113	98	88.3	77.4	103.0
Far Eastern	77	93	105	109	128	94	91	71.3	77.2	99.6
North Caucasian	–	–	119	110	113	130	115	88.5	98.6	105.8

Source: data of the International Institute of Marketing and Social Research GfK Rus. Available at: https://www.gfk.com/ru/ (accessed: 11.10.2018).

The data of VolRC RAS regional monitoring correlate in many aspects with nationwide figures. During the period from 2000 to 2017 (except for the time period from 2005 to 2008), the consumer sentiment index of the Vologda Oblast residents was below the neutral level of 100 points, which indicates the predominance of negative assessments regarding people's own standard of living and quality of life and their uncertainty concerning the prospects of economic development *(Fig. 2)*. The negative dynamics of CSI was most significant in the crisis year of 2009 (the index fell to 75 points) and 2015 (77 points). In 2017, there was a trend of increasing consumer activity in the region: compared to the level of 2016, the consumer sentiment index increased by six points (from 78 to 85 p.).

In addition to the consolidated CSI, its components are of interest as well, since they allow us to analyze individual components of the comprehensive process of formation and realization of the final consumer demand. Although all the components of CSI characterize different sides of the same processes taking place in the economy and people's attitude toward them, each of these components brings something new [29].

Figure 2. Consumer sentiment index dynamics in the Vologda Oblast, points

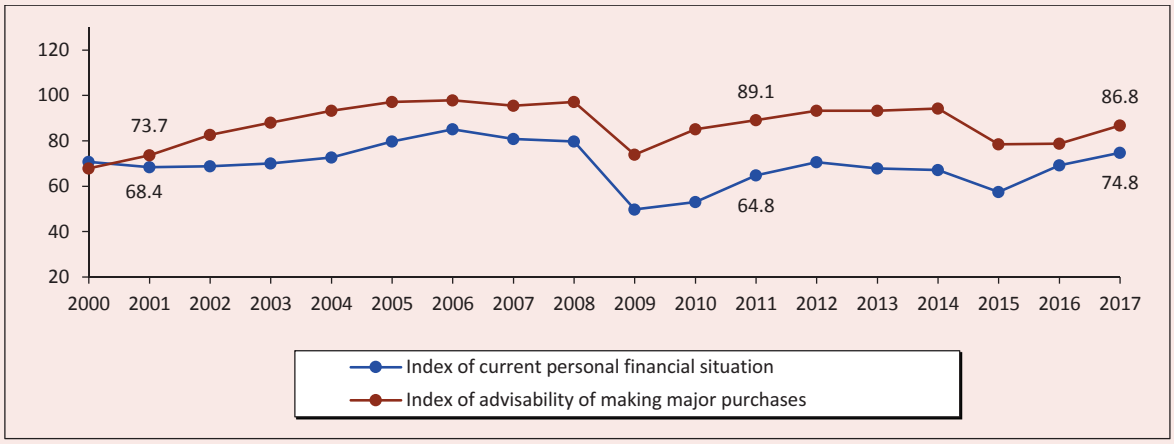


Source: VolRC RAS monitoring data.

"Primary" private components of CSI can be divided into two groups: 1) indices of the current state (current components), which include the index of the current personal financial situation and the index of expediency of making large purchases, and 2) indices of consumer expectations (components of expectations), namely the index of the prospects of the personal financial situation and the indices of short-term (1 year) and long-term (5 years) prospects of the country's economy.

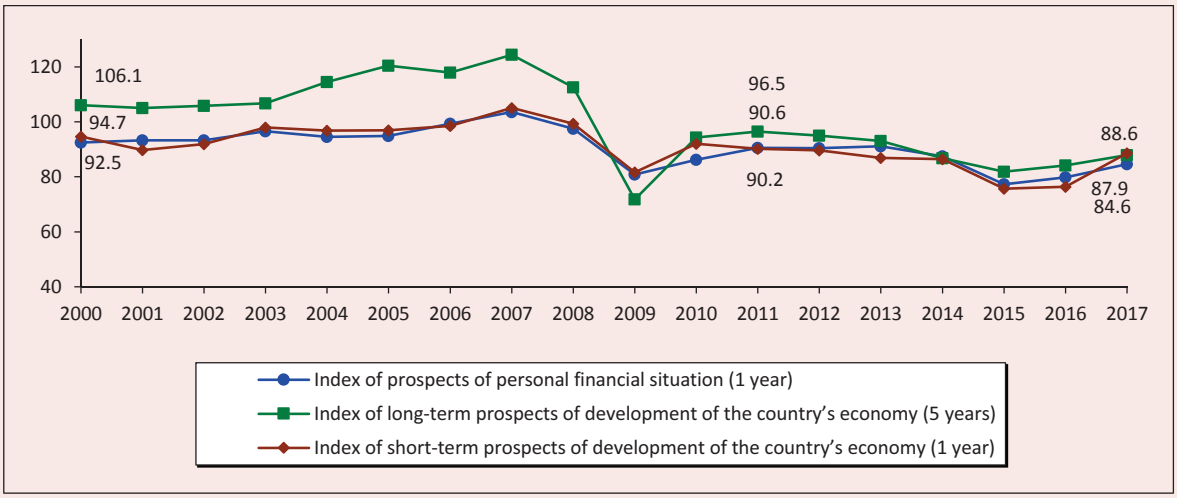
If we consider the current components, we can observe a complete synchronization of the dynamics of these two partial indices *(Fig. 3)*. The most significant falls were observed in 1998–1999 (by 28 and 14 points, respectively), in 2008–2009 (by 30 and 23 points), and in 2014–2015 (by 9 and 15 points). In 2016–2017, the situation began to change for the better, but it is too premature to talk about sustainable growth due to the continuing economic and political instability and uncertainty of prospects

Figure 3. Dynamics of the indices of the current state, points



Source: VolRC RAS monitoring data.

Figure 4. Dynamics of the consumer expectations indices, points



Source: VolRC RAS monitoring data.

We can compare the analysis of the components of expectations included in CSI with each other in two aspects: on the one hand, expectations related to the "personal" and "public", the time horizon of which is the same (for a year); on the other hand, the estimates of "social prospects" (in a year and in five years), i.e., short-term and long-term expectations for development of the country's economy *(Fig. 4)*.

The annual expectations regarding the country's own financial and economic situation are quite close to each other – the corresponding indices practically coincide. As for the assessment of public prospects for one year and five years, we would like to note the following. First, it is the synchronicity of the dynamics of the two curves, reflecting the short-and long-term economic expectations of consumers. Second, there is a noticeable gap between the two indices: the level of people's assessment of the five-year prospects for the country's economic development throughout the observed period remains significantly higher than annual expectations. In addition, it is the only index of the consolidated CSI, the values of which are closest to the threshold of 100 points, and sometimes exceed it. Such a situation is explained not only by national traditions of belief in a "better tomorrow", but also by quite practical reasons related to the realities of the present – the low standard of living and quality of life of a large part of the population of the region, the lack of a sense of stability, etc.

Thus, the main trends in the consumer sentiment index and its constituent private indices in the region indicate the presence of similar dynamics in the indicators under consideration and allow us to talk about the correlation between the perception of the current state and future expectations. At the same time, long-term forecasts for the development of the country's economy look more optimistic than the estimates of the current state and short-term prospects.

Impact of macroeconomic indicators on consumer sentiment

Being a synthetic indicator, CSI reflects a wide range of purely economic, political, social and other phenomena and processes taking place in the social life of the country and the region.

Since the changes in consumer sentiment can have a significant impact on the economy of regions and the country as a whole, there is a need to determine the factors that affect consumer sentiment. It is obvious that the mood of a person as a consumer is formed primarily under the influence of economic factors, more precisely, those that directly or indirectly affect his/her budget, purchasing power, material consumption: the factors include the general economic situation in the region, the sectoral structure of employment, features of regional socio-economic policy, state revenue policy, inflation level, retail trade, etc.

The undoubted advantage of the index method is the ability to use mathematical tools for a more in-depth analysis and assessment of the situation. In this regard, we use multiple regression analysis to study the impact indicators characterizing the socio-economic development, standard of living and quality of life of the Vologda Oblast residents on their consumer behavior.

In the course of our research, we build and test autoregressive distributed lag models (ARDL models) on the basis of statistical data and sociological surveys over the period from 2000 to 2017. The time series were made stationary through the use of a chain growth rate of the analyzed indicators. The stationarity test was carried out using the Dickey–Fuller test (see Appendix).

We used several criteria to verify the adequacy of the model: autocorrelation criteria in residuals (Ljung–Box tests), tests to check the normality of distribution of residuals (Shapiro–Wilk tests). Among the adequate models, we selected a model with the fewest number of parameters using the Akaike information criterion (AIC) and the Schwarz information criterion (BIC) [30].

We used R-Studio software product and MS Excel spreadsheets for data analysis and visualization.

We took the following private components of the index of consumer sentiment as explained variables: the index of the current personal financial situation (Y_{1t}), the index of expectations of changes in the personal financial situation (Y_{2t}), the index of expediency of making large purchases (Y_{3t}), the index of short-term prospects of development of the country's economy (1 year) (Y_{4t}), the index of long-term prospects of development of the country's economy (5 years) (Y_{5t}) *(Tab. 5)*.

We used the following macroeconomic indicators as explanatory factor variables: real disposable money income (X_{1t}), retail trade turnover of non-food products (X_{2t}), retail trade turnover of food products (X_{3t}), retail trade turnover (X_{4t}), the index of industrial production in the Vologda Oblast (X_{5t}), consumer price index (X_{6t}) *(Tab. 6)*.

As a result of the multicollinearity test, factor X_{4t} (retail turnover, % of the corresponding period of the previous year in comparable prices) was excluded from consideration, because it has a high cross-correlation with other explanatory variables (correlation coefficient is above 0.75):

Factor	X_{1t}	X_{2t}	X_{3t}	X_{4t}	X_{5t}	X_{6t}
X_{1t}	1.00					
X_{2t}	0.66	1.00				
X_{3t}	0.71	0.45	1.00			
X_{4t}	**0.81**	**0.84**	**0.86**	1.00		
X_{5t}	0.64	0.29	0.56	0.50	1.00	
X_{6t}	0.27	-0.03	0.47	0.25	0.26	1.00

Table 5. Dynamics of the private components of CSI (in % to the previous year)

Year	Index of the current personal financial situation, Y_{1t}	Index of expectations of changes in the personal financial situation, Y_{2t}	Index of expediency of making large purchases, Y_{3t}	Index of short-term prospects of development of the country's economy (1 year), Y_{4t}	Index of long-term prospects of development of the country's economy (5 years), Y_{5t}
2000	171.0	138.3	147.6	182.0	128.8
2001	96.6	99.8	108.5	99.0	94.7
2002	100.6	101.1	112.1	100.9	102.5
2003	101.7	103.5	106.5	100.8	106.6
2004	103.9	97.9	106.0	107.2	98.8
2005	109.6	100.3	104.1	105.2	100.2
2006	106.8	105.0	100.8	97.8	101.6
2007	94.9	104.0	97.5	105.5	106.6
2008	98.8	94.1	101.8	90.5	94.5
2009	62.4	83.0	76.0	63.8	82.3
2010	106.4	106.6	115.3	131.3	112.6
2011	122.3	105.1	104.6	102.3	98.0
2012	109.0	99.8	104.7	98.4	99.3
2013	96.2	101.7	100.0	98.0	97.0
2014	98.8	95.2	101.1	93.2	99.5
2015	85.7	88.3	83.2	87.2	94.7
2016	120.3	103.2	100.4	100.9	102.8
2017	108.1	106.0	110.2	115.9	104.4

Source: VoIRC RAS monitoring data.

Table 6. Dynamics of indicators of socio-economic development in the Vologda Oblast (in % to the previous year)

Year	Real disposable money income, X_{1t}	Retail trade turnover of non-food products, X_{2t}	Retail trade turnover of food products, X_{3t}	Retail trade turnover, X_{4t}	Index of industrial production in the Vologda Oblast, X_{5t}	Consumer price index, X_{6t}
2000	113.9	95.6	125.9	112.7	107.7	119.7
2001	103.9	115.1	108.5	111.0	99.5	115.4
2002	110.2	120.8	104.6	110.1	104.2	113.1
2003	108.3	108.8	107.3	107.9	103.3	113.1
2004	105.5	113.7	102.6	106.8	106.6	111.8
2005	106.4	117.7	94.6	103.7	105.9	111.3
2006	122.4	125.0	109.6	117.7	105.2	109.2
2007	109.6	119.4	115.6	117.2	103.0	112.7
2008	100.4	111.4	106.2	108.5	95.3	114.3
2009	90.0	89.4	89.1	89.4	90.5	107.2
2010	108.2	114.9	117.2	116.3	111.8	109.2
2011	100.9	113.8	102.8	107.9	105.6	105.7
2012	110.6	125.9	114.9	119.7	101.3	106.0
2013	105.6	103.5	100.1	101.7	102.5	107.2
2014	102.3	100.3	103.8	102.0	103.7	112.0
2015	97.2	87.4	92.5	90.3	102.6	112.0
2016	98.8	92.8	92.9	92.8	99.1	105.0
2017	92.2	104.6	104.2	103.6	101.0	102.2

Source: data of the territorial office of the Federal State Statistics Service in the Vologda Oblast. Available at: http://vologdastat.gks.ru/

Econometric modeling often uses the impact of factors on the resultant variable; this impact is not instantaneous, but happens with some delay. Among the reasons, which can cause the delay we can allocate institutional, technological factors, etc. The emerging time lag can include the following components:

– information processing time;
– information transfer time;
– time to implement the decision;
– time to obtain visible effect [31].

Inertia is expressed in the fact that past events have an impact on present and future events.

In the framework of our study, we included lagged dependent variables X_{t-1} in the model. This is quite reasonable, since the dependent variable is influenced not only by the current values of the explanatory factor, but also by its lags, namely the consumer sentiment can depend not only on the macroeconomic indicators in the current year, but also on the indicators taken at previous time points.

The distributed lag model can be estimated using the common method of least squares (MLS):

$$y_t = a + b_0 x_t + b_1 x_{t-1} + \varepsilon_t. \quad (1)$$

However, this model should be distinguished from the autoregressive distributed lag model (ARDL model):

$$y_t = a + b_0 x_t + b_1 y_{t-1} + b_2 x_{t-1} + \varepsilon_t \quad (2)$$

In the model (1), the regressors are not correlated with the errors, so it can be estimated using the method of least squares. In the model (2), y_{t-1} includes ε_{t-1}, so the error vector ε and the matrix of regressors X are correlated. It follows that the MLS estimates are not unbiased.

The application of MLS to distributed lag models can be difficult due to the following reasons:

1) in the case of the tendency of explanatory variables, which causes the multicollinearity of factors;

2) due to the autocorrelation of residuals, since the regression is based on time series.

However, the above-mentioned reasons in our paper were eliminated by bringing the time series under consideration to a stationary form by using chain growth rates of the indices and macroeconomic factors that we analyzed.

In the course of our study, we tested several autoregressive distributed lag models on the basis of data for the period from 2000 to 2017. The models we constructed reflect the dependence of consumer sentiment of the Vologda Oblast residents on the indicators that characterize socio-economic development, living standards and the quality of life.

The results of the simulation we carried out are presented in *Table 7*.

According to the econometric analysis, the index of retail trade turnover of non-food products exerted positive influence on the indices of the current state (the index of the current personal financial situation and the index of expediency of making large purchases) in the current period and negative influence – in the previous period. This is due to the fact that if the sales of non-food products for the year increased significantly, then people are likely to assess this situation as favorable in terms of their own material well-being and the purchase of durable goods. Negative dependence can be interpreted if we pay attention to the specifics of the interaction between the conditions for the purchase of durable goods and people's savings. In Russia, in order to make an expensive purchase, in most

Table 7. ARDL models showing the dependence of consumer sentiment on the indicators characterizing socio-economic development of the region

Factors	Index of the current personal financial situation, Y_1	Index of expectations of changes in the personal financial situation, Y_2	Index of expediency of making large purchases, Y_3	Index of short-term prospects of development of the country's economy (1 year), Y_4	Index of long-term prospects of development of the country's economy (5 years), Y_5
X_{1t}					
X_{1t-1}					
X_{2t}	0.71**		0.68***	0.41.	
X_{2t-1}	-0.58**		-0.38*	-0.44*	
X_{3t}		0.61*			0.33*
X_{3t-1}					-0.23*
X_{4t}					
X_{4t-1}					
X_{5t}		0.81.		1.72**	0.65*
X_{5t-1}	2.17***				
X_{6t}	-1.31*				
X_{6t-1}					
Y_{t-1}	-0.41**				
R^2 – determination coefficient	**0.58**	**0.77**	**0.79**	**0.87**	**0.90**
N –number of observations	17	17	17	17	17
Autocorrelation in residuals (Box-Ljung test)	X-squared = 2.1011, p-value = 0.1472 Absent	X-squared = 0.24791, p-value = 0.6185 Absent	X-squared = 3.0495, p-value = 0.08076 Absent	X-squared = 4.1919, df = 2, p-value = 0.123 Absent	X-squared = 0.26768, p-value = 0.6049 Absent
Normality of distribution of residuals (Shapiro-Wilk normality test)	W = 0.98878, p-value = 0.998 Present	W = 0.92019, p-value = 0.1303 Present	W = 0.96117, p-value = 0.6536 Present	W = 0.93633, p-value = 0.2772 Present	W = 0.9679, p-value = 0.7808 Present
* ,**, *** – significance at the 10% 5% and 1% level, respectively.					

cases it is necessary to accumulate certain cash savings, so the increase in the sales of non-food products in the past year adversely affects the sentiment in the current year.

The index of industrial production also has a positive impact on the index of the current financial situation and a negative impact on the growth of prices (consumer price index). This is due to the fact that actual events in the economy (production growth, inflation) affect the financial situation of consumers and are reflected in their minds, which ultimately manifests itself in the dynamics of the corresponding index.

Consumer expectations indices (index of expectations of changes in the personal financial situation, indices of short-term and long-term prospects of development of the country's economy) are affected by the changes in the same macroeconomic indicators (retail trade turnover, industrial production index, consumer price index). This is largely due to the inertia of consumer expectations, and also due to the fact that the dynamics of their expectations are determined by the dynamics of past assessments, i.e., the trends noted in the past are transferred to the future.

In general, the analysis of the relationship between the components of the consumer sentiment index and the real indicators of macroeconomic development of the region leads to the conclusion that this relationship is present and is quite significant. This indicates that people perceive adequately the events that are taking place in the economy and are sensitive to their changes.

Conclusions

The construction and use of indices as generalizing (integral) indicators can provide a comprehensive representation of complex social and economic phenomena and processes.

The index approach, which is an effective tool for processing sociological data, provides a number of unique opportunities for the study and evaluation of consumer sentiment in the given territory.

First, integral indices provide information on the dynamics of people's optimism in relation to economic and social development in the region or country as a whole. Indices do not show absolute values (i.e. prevalence) of the corresponding estimations and opinions, but they reflect a measure or degree of their "positivity" (sign) in any time or group comparisons [32]. The use of the index method helps identify the ratio of positive and negative attitudes in society, register "critical points" in public opinion, analyze fluctuations and changes in the index over time, comparing it with other socio-political and economic processes taking place in society [33].

Second, by calculating the indices with the use of a comparable methodology, it is possible to analyze consumer sentiment of residents in different territories – countries, federal districts, individual regions, and it is possible to carry out interregional and inter-country comparisons of such sentiment in order to assess the overall socio-economic situation, as well as the standard of living and quality of life in a certain territory.

Third, the use of the index approach provides researchers with ample opportunities to use mathematical tools for modeling the data of official statistics and sociological surveys and for a more in-depth analysis and assessment of the situation. The combination of the index approach with mathematical methods and techniques allows us to identify factors that influence consumers' mass consciousness and this, in turn, helps predict changes in consumer activity and economic development of the territory.

In addition, the indices and their components can be obtained more quickly than the macroeconomic indicators provided by official statistics and characterizing the external environment for consumer action. Therefore, the indices serve as unique indicators for independent non-state examination of the economic policy of the state and implementation of an integrated approach to assessing the effectiveness of public administration [34].

Our analysis of the dynamics of CSI and its constituent private indices at the national and regional level for the period from 2000 to 2017 allows us to conclude that during the periods of accelerated socio-economic transformations, in particular, economic crises, such indices promptly respond to changes in the social environment and objectively reflect and to some extent predict the development of events.

Having conducted the regression analysis, we find out quite a significant correlation between the components of the consumer sentiment index and the real indicators of macroeconomic development of the region (retail trade turnover, industrial production index, consumer price index). This suggests that the changes in the economic situation, reflected

in the moods, estimates, expectations and intentions of the population, affect consumer activity, choice and change of consumer strategies, which, in turn, directly affects economic development in the territory.

The use of the indices under consideration in the studies of consumer behavior provides a rare opportunity to take into account psychological factors in the modeling and forecasting of the economy; this helps identify the trends of the socio-economic situation in time and, on this basis, make adjustments to the management of economic processes.

Appendix

Multiple regression models for the index of current personal financial situation (%of the previous year) and macroeconomic indicators

```
Call:
lm(formula = Y1 ~ Lag(Y1, 1) + Lag(X2, 1) + X2 + Lag(X5, 1) + X6, data = Book)

Residuals:
     Min       1Q   Median       3Q      Max
-12.4490  -4.4532   0.1003   3.9037  10.8546

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  49.4573    60.3880   0.819 0.430178
Lag(Y1, 1)   -0.4085     0.1082  -3.774 0.003078 **
Lag(X2, 1)   -0.5780     0.1642  -3.521 0.004788 **
X2            0.7121     0.1661   4.287 0.001283 **
Lag(X5, 1)    2.1674     0.4752   4.561 0.000815 ***
X6           -1.3066     0.4923  -2.654 0.022415 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 6.992 on 11 degrees of freedom
  (1 observation deleted due to missingness)
Multiple R-squared:  0.8145,..... Adjusted R-squared:  0.7301
F-statistic: 9.658 on 5 and 11 DF,  p-value: 0.0009655
```

Tests for autocorrelation and normality of distribution of residuals

```
Box-Ljung test

data:  residuals(m1)
X-squared = 2.1011, df = 1, p-value = 0.1472

Shapiro-Wilk normality test

data:  residuals(m1)
W = 0.98878, p-value = 0.998
```

Multiple regression models for the expectations of changes in one's personal financial situation (%of the previous year) and macroeconomic indicators

```
Call:
lm(formula = Y2 ~ X3 + X5, data = Book)
Residuals:
   Min     1Q Median     3Q    Max
-9.768 -5.116 -1.357  2.468 17.314

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) -45.4117    35.8578  -1.266   0.2247
X3            0.6055     0.2220   2.728   0.0156 *
X5            0.8123     0.4213   1.928   0.0730 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 7.186 on 15 degrees of freedom
Multiple R-squared:  0.6255,..... Adjusted R-squared:  0.5756
F-statistic: 12.53 on 2 and 15 DF,  p-value: 0.0006321
```

Tests for autocorrelation and normality of distribution of residuals

```
Box-Ljung test

data:  residuals(m2)
X-squared = 0.24791, df = 1, p-value = 0.6185

Shapiro-Wilk normality test

data:  residuals(m2)
W = 0.92019, p-value = 0.1303
```

Multiple regression models for the index of the advisability of making major purchases (as % of the previous year) and macroeconomic indicators

```
Call:
lm(formula = Y3 ~ Lag(X2, 1) + X2, data = Book)

Residuals:
    Min      1Q  Median      3Q     Max
-11.212  -5.104   1.816   3.455   9.562

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  68.0563    17.6538   3.855 0.001750 **
Lag(X2, 1)   -0.3769     0.1413  -2.668 0.018389 *
X2            0.6840     0.1465   4.667 0.000363 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 6.393 on 14 degrees of freedom
  (1 observation deleted due to missingness)
Multiple R-squared:  0.619,..... Adjusted R-squared:  0.5645
F-statistic: 11.37 on 2 and 14 DF,  p-value: 0.001166
```

```
Tests for autocorrelation and normality of distribution of residuals

Box-Ljung test

data:  residuals(m3)
X-squared = 3.0495, df = 1, p-value = 0.08076

> shapiro.test(residuals(m3))

   Shapiro-Wilk normality test

data:  residuals(m3)
W = 0.96117, p-value = 0.6536
```

Multiple regression models for the index of short-term (1 year) development prospects of the country's economy (in % to the previous year) and macroeconomic indicators

```
Call:
lm(formula = Y4 ~ Lag(X2, 1) + X2 + X5, data = Book)

Residuals:
   Min     1Q Median     3Q    Max
-9.245 -4.004 -1.888  4.888 13.300

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) -72.4932    46.4455  -1.561  0.14257
Lag(X2, 1)   -0.4405     0.1720  -2.562  0.02367 *
X2            0.4008     0.2011   1.993  0.06766 .
X5            1.7232     0.4659   3.699  0.00268 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 7.38 on 13 degrees of freedom
  (1 observation deleted due to missingness)
Multiple R-squared:  0.7617,..... Adjusted R-squared:  0.7068
F-statistic: 13.85 on 3 and 13 DF,  p-value: 0.0002417

Tests for autocorrelation and normality of distribution of residuals
Box-Ljung test

data:  residuals(m4)
X-squared = 4.1919, df = 2, p-value = 0.123

> shapiro.test(residuals(m4))

   Shapiro-Wilk normality test

data:  residuals(m4)
W = 0.93633, p-value = 0.2772
```

Multiple regression models for the index of long-term (5 years) development prospects of the country's economy (in % to the previous year) and macroeconomic indicators

```
Call:
lm(formula = Y5 ~ Lag(X3, 1) + X3 + X5, data = Book)

Residuals:
    Min      1Q  Median      3Q     Max
-4.6284 -2.2355  0.0751  2.1033  5.8870

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) 23.18491   24.77036   0.936   0.3663
Lag(X3, 1)  -0.22934    0.09464  -2.423   0.0307 *
X3           0.32766    0.12029   2.724   0.0174 *
X5           0.65088    0.21954   2.965   0.0110 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 3.498 on 13 degrees of freedom
  (1 observation deleted due to missingness)
Multiple R-squared:  0.7714,..... Adjusted R-squared:  0.7186
F-statistic: 14.62 on 3 and 13 DF,  p-value: 0.0001857
```

Tests for autocorrelation and normality of distribution of residuals

```
Box-Ljung test

data:  residuals(m5)
X-squared = 0.26768, df = 1, p-value = 0.6049

> shapiro.test(residuals(m5))

   Shapiro-Wilk normality test

data:  residuals(m5)
W = 0.9679, p-value = 0.7808
```

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Priorities of Budget Financing of Cities and Regions of the Russian North*

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Abstract. The paper analyzes the phenomenon of the flypaper effect – non-identical growth of inter-budget transfer and equivalent growth of private income for budget expenditures – in the relations between the budgets of the Northern entities of Russia and their local budgets for 2013–2016. We conduct comparative assessment of the budget response to changes in parameters of the private sector on the one hand; on the other hand, in parameters of relations with the budget of another level. The relevance of the proposed study of inter-budget relations lies in determining the effects of inter-budget redistribution and optimal expenditures at different levels of the budget system in the current system of distribution of expenditure obligations. The purpose of the present research is to reveal the consequences of allocation of non-target transfers from budgets of the entities in the Russian North from the point of view of fiscal incentives formed in the process of inter-budget relations and the models of behavior of local budgets created by these incentives. For the Republic of Karelia and the Sakhalin Oblast, the flypaper effect in inter-budget relations of regional and local budgets has been revealed. In the Arkhangelsk Oblast, Khanty-Mansi and Yamalo-Nenets autonomous okrugs, Kamchatka Krai, the republics of Komi and Sakha (Yakutia), the flypaper effect has not been revealed. It has been established that local budgets in the Republic of Karelia and the Sakhalin Oblast act in the interests of the regional budget to a relatively greater

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extent, they are more willing to expand production of local goods. In other regional budget systems, local budgets have a relatively more flexible fiscal policy, acting in the interests of local taxpayers, but at the expense of reducing regional benefits. It is assumed that budget systems of entities with the flypaper effect demonstrate lower differentiation of local and regional expenditures, which prevents decentralization; as well as higher dissatisfaction with the value of basic services in the public sector, which reduces the need for local differentiation. The author demonstrates the promising areas of interregional research. It has been revealed that the causes of the flypaper effect cannot be detected by analyzing traditional indicators of finance and regional economy.

Key words: flypaper effect, the North, Russia's constituent entities, local budgets, grants.

Introduction

The research in inter-budgetary relations including the study of causes and consequences of budgetary funds redistribution lay emphasis on fiscal incentives of relations participants' motivation that form a basic budgetary framework (composition and structure of revenue and expenditure). The analysis of fiscal incentives is intended to reflect the result of balancing positive (for example, equalization of territorial budgets' revenues) and negative (discouragement of tax base growth) properties of transfers in terms of budget system efficiency.

We should mention one of the ways to analyze inter-budgetary relations, such as a comparative assessment of the budget's reaction (in terms of its actual costs) to changes in the private sector parameters (private income[1]) and the parameters of relations with the budget of another level (inter-budgetary transfers). The phenomenon, when growth in transfers and equivalent growth in private income for budget expenditures are non-identical is called a flypaper effect (in another way it can be called the effect of high dependence of expenses on transfers).

From a conceptual point of view, the flypaper effect is a rise in budget expenditures after receiving an inter-budgetary transfer (usually non-targeted[2]), exceeding the growth that could be caused by a similar increase in private income in a given territory, taking into account the marginal propensity to consume local public goods on the part of population (see, for example [1; 2; 3]). Resources "stick" to the budget system, in contrast to the neoclassical paradigm theory: the authorities defending the interests of a representative voter-taxpayer would find it more profitable to reduce the tax burden by increasing population's welfare [4].

However, there is no clear opinion about the flypaper effect in the literature. Thus, its existence is denied for a wide range of reasons, including:

1. Emergence of the incentive to reduce own income and consequently decrease total costs, which is identified clearly [5] or adjusted for endogeneity[3] (adjusted for recipient's ability to influence parameters) of a transfer [6]. In other words, there is a displacement of own budget revenues by an inter-budgetary transfer.

2. Nature of the budget restriction of a recipient in case of a targeted limited transfer [7].

3. Underestimation of spatial factors in the works, indicating the presence of the flypaper

[1] Indicators of private income are usually a volume of territory's gross product or a payroll amount.

[2] For the RF budgetary system – governmental grants.

[3] For the purpose of this work endogeneity of parameters refers to the reverse impact of this variable, considered dependent (Y) on the variable considered independent (X).

effect – interconnection of the budget parameters of the adjacent territories [8].

As for analysis methods, in terms of possible flypaper effect existence, in empirical research the works proposing correct methods for quantitative estimation of the effect are of importance [9; 10; 11].

On the other hand, it is empirically shown that if the increase in expenditures of a recipient budget due to grown private income is estimated at about 0.1 units [12; 13; 14], the range of changes in expenses per a transfer can vary from 0.25 to 1.06 [3]. For non-targeted transfers, the stimulating effect on costs is less pronounced (0.25–0.43 [15] or 0.4–0.5 [14]) and, therefore, the analysis of their impact is of particular interest. Indeed, even the fact of (partial) displacement of own revenues by inter-budgetary transfers in the conditions of endogeneity does not guarantee the absence of the flypaper effect. The degree of displacement depends on characteristics of a study object, such as a type and conditions of the use of a transfer, preferences regarding co-financed expenditure items in case of a targeted transfer, the state of a budget and the socio-economic situation of a municipality and other circumstances [16; 17].

Public finance is the main area of research and practical application of the flypaper effect phenomenon. However, it is also considered in the framework of the theory of public choice [18] and widely studied in the political economy of inter-budgetary relations – in the relations between levels of the budget system [19] and in the political process at the local level [20; 21]. It is believed that at the regional level, the flypaper effect is particularly vivid in the co-financing (including in the form of non-targeted transfers) of the most important powers of a local budget [22].

As for the Russian budget system, the flypaper effect method is also used, but with various modifications of the quantitative assessment method. P. Kadochnikov et al. [23] applies a system of simultaneous equations, where the growth in costs depends on the increase in a transfer. According to the 1996–2000 data, the greater part of the increase in federal transfers financed the subjects' budgets, a recipient acted in the interests of the donor budget, that is, the flypaper effect was identified. L. Freinkman and A. Plekhanov [24] use the aspect of this concept in relation to the degree of lower budgets decentralization. They confirm the hypothesis of a negative impact of inter-budgetary transfers in terms of reducing decentralization (growth of centralization) of the Russian budget system on the basis of the 1996–2001 data. The work [25] considers linear regression under the general scheme used in this work, with the GRP of Russian subjects as an income indicator. On the basis of the 1996–2006 data the researchers prove the flypaper effect existence in the relations between the federal budget and the subjects' budgets.

Thus, the attention of domestic researchers, interested in the behavior of a recipient budget after receiving an inter-budgetary transfer, is focused on the level of relations between a federal and region's budget. In our work, the flypaper effect method is applied to the budget systems of ten Northern regions of Russia (a level of "a subject's budget – a city/district's budget"). The calculations are conducted for ten Northern subjects of Russia[4].

4 Arkhangelsk Oblast, Khanty-Mansik Autonomous Okrug, Yamalo-Nenets Autonomous Okrug, Kamchatka Krai, Republic of Karelia, Komi Republic, Magadan Oblast, Murmansk Oblast, Republic of Sakha (Yakutia), Sakhalin Oblast. Due to the lack of data, Chukotka and Nenets Autonomous okrugs are excluded from consideration.

General approach and relevance of the flypaper effect analysis

Methodologically, the flypaper effect is a tool (concept) to analyze the system of inter-budgetary relations by estimating applicability of the effect appearance causes proposed by the theory for the given system.

The basis for quantitative calculations of the flypaper effect is the assessment of parameters of the expenses dependence on income and transfer factors (1), formulated on the basis of the utility function of a recipient budget:

$$Expenditure_{it} = f(Private\_Income_{it}, Transfer_{it}, X_{it}^{J}), \quad (1)$$

where *Expenditure* – budgetary costs;

Private_Income – a private income variable;

Transfer – an inter-budgetary transfer variable;

X – a vector of auxiliary variables.

The values of partial derivatives of a costs variable are determined and compared:

$$\frac{dExpenditure}{dPrivate\_Income} \text{ V } \frac{dExpenditure}{dTransfer}. \quad (2)$$

The flypaper effect analysis is an aspect of the analysis of the problem of an optimal value of public goods supply in the economic system. The provision of an inter-budgetary transfer reduces the value of general territorial benefits (donor's expenses) in order to expand the provision of local ones. It is believed that the "loss" of the former exceeds the production of the latter in value terms[5] [26], but is more effective on the scale of economy as a whole (due to the arguments about the effectiveness of costs decentralization, distribution of tax powers and less distorting effect of general territorial taxes). *Identification* of the flypaper effect reveals "compensation" of this loss at the expense of the sector of private goods production and the satisfaction of budget-donor's interests. The absence of the effect indicates a more flexible (with the potential to reduce the burden) tax policy of a recipient budget and potentially its greater consideration of local taxpayers' interests; still financial resources go back to the private sector at the amount exceeding the effective level. Thus, the research in inter-budgetary relations through tools of the flypaper effect concept is relevant, as it tries to understand optimality of the relative magnitude of costs of the budget system of different levels within a particular model of expenditure commitments distribution. Besides, application of the method can clarify effects of inter-budgetary redistribution in the context of sectors (private/public) and balance of actors' interests (taxpayer and donor budget).

Theoretical factors (causes) of the flypaper effect can be summarized as follows:

- the theoretical message about impossibility of the flypaper effect is incorrect, non-identicalness of the impact of income and transfer is devoid of research interest (the topic of the flypaper effect loses a significant degree of relevance);
- the incorrect method for assessing data leading to a false conclusion about existence of the effect that is not actually present;
- the lack of authority and independence of budgets – transfer recipients;
- the local tax policy is not able to provide an optimal level of tax burden;
- the need for increased financing of local public goods on the part of a group of actors;
- the phenomenon of incomplete information, causing fiscal illusion and action towards suboptimal results;
- features of the inter-budgetary transfer system – recipient's inadequate assessment of their nature or subtle details in the distribution design.

[5] This is due to the mechanism of fiscal illusion, which causes the growth in unit cost price, involving the decline in demand for spending and the reduction in direct spending.

Evaluation method, data sources

The purpose of the study is to determine the consequences arising in the process of allocation of non-targeted transfers at the level of budgets of cities and districts of Northern subjects of Russia, including fiscal incentives.

The system of inter-budgetary relations between budgets of Russian subjects and budgets of urban districts and districts is a study object.

The impact of remuneration parameters in a municipality and non-targeted inter-budgetary transfers (grants), received by a local budget, on budget expenditures is a study subject.

In this work in order to analyze inter-budgetary relations of northern budgets of the constituent entities of Russia and their cities and districts (local budgets), the traditional model to calculate the flypaper effect, is modified as follows:

$$E_{it} = A \times Payroll_{it}^{\alpha_1} \times Gen.Grant_{it}^{\alpha_2} \times PRICE_{it}^{\alpha_3} \times \prod_{j=4}^{n} (X_{it}^{j})^{\alpha_j} \times \varepsilon_{it}, \quad (3)$$

where E – expenses of a local budget of a RF subject;
A – an intercept term;
Payroll – annual accrued wages of organizations employees in a municipality;
Glen.Grant – a total amount of grants received by a local budget;
PRICE – a price of expenses co-financed by targeted transfers, perceived by a recipient (by analogy with the method used in [9]);
X – a vector of auxiliary variables:

$$X^j = \{R(Publ.Empl.); R(Elderly)\}.$$

Interpretation of auxiliary variables:
R (Publ.Empl.) – a share of the employed in state-owned organizations,
R (Elderly) – a share of the population over the working age in the territory,
The values of indicators are taken per capita at 2016 values (for the Komi Republic – 2015) by indexing by the annual consumer price index.

A relative price factor was added to the main cost factors, which is an indicator of the willingness to bear costs that are co-financed through targeted transfers. For example, the higher the share of targeted transfers in local budget expenditures and the lower the preference for co-financed expenditure items, the higher the price of targeted local budget expenditures. Two supporting variables, such as a share of the public sector and a share of the older population, were also taken into account.

As an econometric technique, the least squares method (LSM) is used for panel data with fixed (a fixed effect model) or random effects (a random effect model). The fixed effects model shows the contribution of variables compared to its own reference base and fixes the interaction of variables with unexplained variation factors (errors); thus, the list of variables to be evaluated may not be exhaustive. Coefficients in the random effect model are considered to be more effective, but are more often biased, since they correlate with the error vector (whereas it is required that in this model the effects not explained by explicit variables are minimal). The choice of a particular model is based on the Hausman test results.

The calculations are carried out after linearization (3) by means of taking the logarithm. The factor contribution is calculated through partial derivatives:

$$\frac{\partial E}{\partial Payroll} = \exp(\alpha_0) \times Gen.Grant^{\alpha_2} \times PRICE^{\alpha_3} \times \prod_{j=4}^{n}(X^j)^{\alpha_j} \times \alpha_1 \times Income^{(\alpha_1-1)},$$

$$\frac{\partial E}{\partial Gen.Grant} = \exp(\alpha_0) \times Payroll^{\alpha_1} \times PRICE^{\alpha_3} \times \prod_{j=4}^{n}(X^j)^{\alpha_j} \times \alpha_2 \times Gen.Grant^{(\alpha_2-1)}, \quad (4)$$

$$\frac{\partial E}{\partial PRICE} = \exp(\alpha_0) \times Payroll^{\alpha_1} \times Gen.Grant^{\alpha_2} \times \prod_{j=4}^{n}(X^j)^{\alpha_j} \times \alpha_3 \times PRICE^{(\alpha_3-1)}.$$

The main analysis period includes 2013–2016. The choice is determined by the presence/absence of information on average wages in municipalities. For the *Komi Republic*, due to the availability of data, the calculations are made for 2006–2015 and separately for 2013–2015 (the latter – to compare with the results for other Russian subjects). The lack of data for 2016 and the calculation conducted for earlier periods allow us to compare the importance of including a specific time period in the inter-regional comparison. In the *Magadan and Murmansk oblasts*, on the contrary, the analyzed period is narrowed (2013–2015 and 2013–2014, respectively) due to a lack of data on accrued wages.

The calculations for local budgets of the *Republic of Karelia* are carried out in two versions – in nominal values (according to the statistics) and recalculated ones with regard to a possible representation error – as the anomalous values of local budgets expenses in the Kalevalsky, Kondopozhsky and Medvezhyegorsky Municipal districts are found in the 2014 data (an order of magnitude higher than the average for 2006–2016).

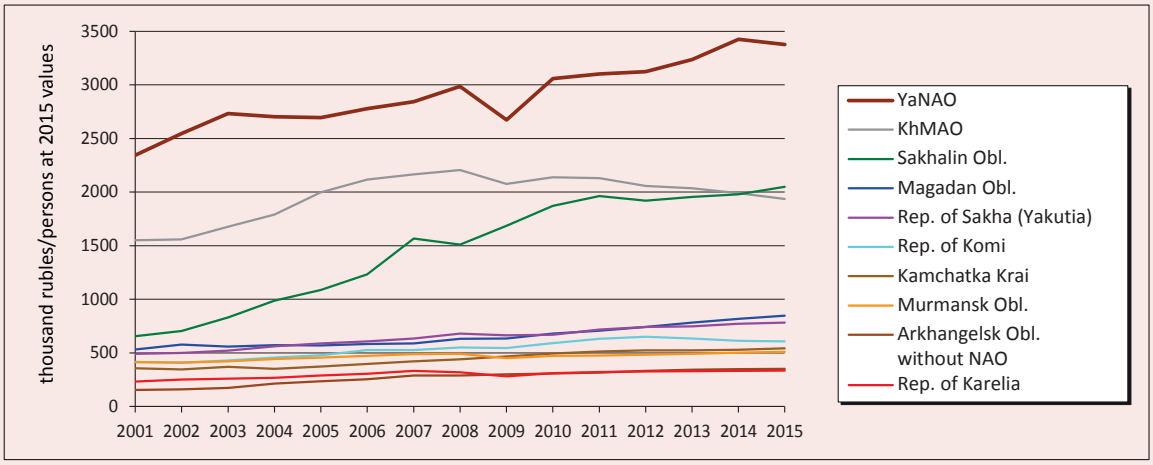
The Federal State Statistics Service of the Russian Federation (database "Indicators of municipalities" (DB IM) is the main source of primary data. The data for the Komi Republic are based on the information of the Ministry of Finance of the Komi Republic (report on the budget performance of the Komi Republic) and the Statistical Yearbook issues.

For the Komi Republic the data on the amount of a grant are not actual, but calculated (instrumental variable) in order to reduce the risk of endogeneity (mutual influence of dependent and independent variables). The calculations for modeling the amount of a grant are carried out by means of with the time-specific fixed effect by factors of budgetary provision before the grant allocation for equalization and the proportion of population over the working age in the Komi Republic municipalities. All the values for districts and cities in the Republic are also indexed by values of the budget expenditure index published by the Ministry of Finance of the Komi Republic in order to neutralize inter-municipal differences and bring the values in a comparable form, taking into account differences in the level of prices (labor costs and utilities) in municipalities.

Preliminary analysis of the Northern Russian regions

Both autonomous districts of the Ural Federal District and the Sakhalin Oblast (*Fig. 1*) can be distinguished by the size of gross regional product (GRP). The rest seven entities

Figure 1. Gross regional product



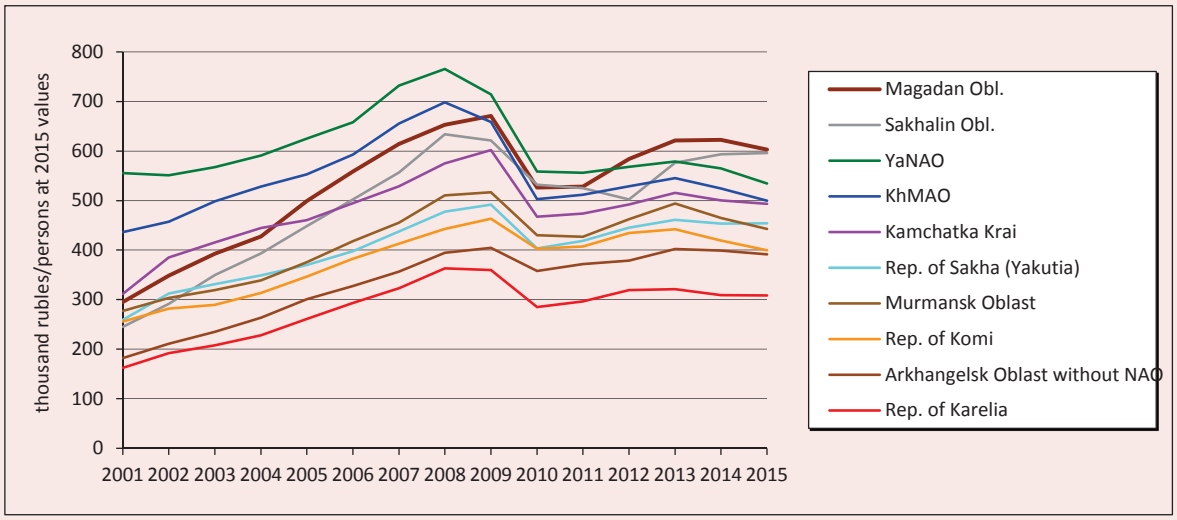
Note. Indexed by the index of physical volume of GRP.

Source: Federal State Statistics Service of the Russian Federation.

are relatively close to each other. Almost all the subjects are characterized by a weak upward trend, with the exception of Khanty-Mansi Autonomous Okrug (KhMAO) and the Komi Republic, where the specific GRP values began to decrease in 2011 and 2013, respectively.

By the indicator of accrued wages, the differentiation between the subjects under consideration is much smaller than by GRP, while the dynamics is less unambiguous (*Fig. 2*). The subjects of the Asian part of Russia and economically developed autonomous districts

Figure 2. Annual payroll



Note. Indexed by the consumer price index.

Source: Federal State Statistics Service of the Russian Federation.

(KhMAO and Yamalo-Nenets Autonomous Okrug (YaNAO)) are significantly ahead of the subjects of the country's European North.

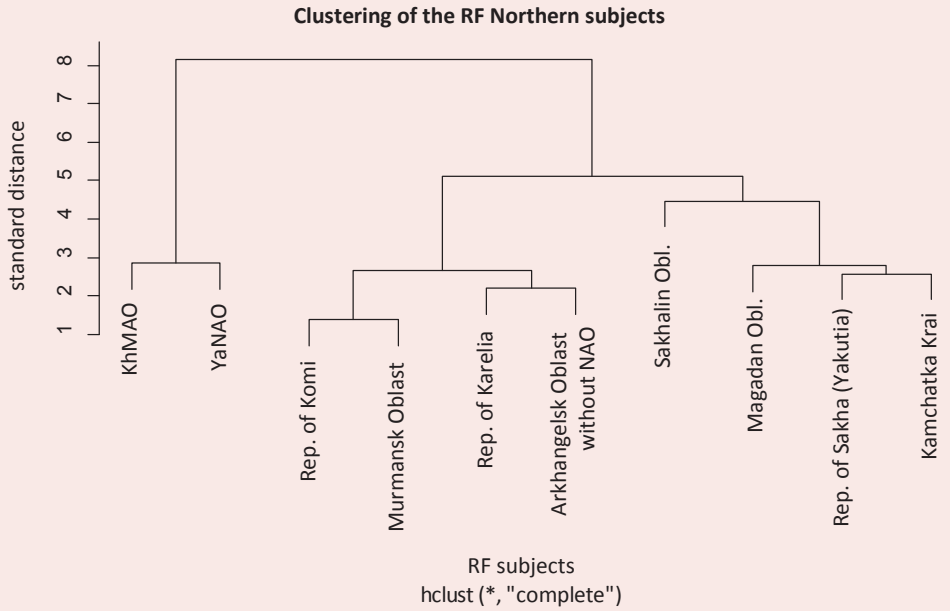
Thus, the preliminary analysis of the Northern Russian subjects indicates the dominance of autonomous okrugs of the Ural Federal District and the Sakhalin Oblast by economic development in terms of gross regional product and the lagging nature of European regions in terms of specific wages.

The analysis of a larger number of factors (see note to Fig. 3) allows us to make grouping (clustering) of the considered subjects of Russia. When approaching at the level of five standardized (indicators are normalized by the value of their standard deviation) units of distance between subjects (which is about half of the total standardized distance), three groups of budget systems are clearly distinguished (*Fig. 3*). They coincide with the group selected by a geographical basis. Economically developed KhMAO and YaNAO, subjects of the European North of Russia and Asian Northern regions are approximately homogeneous within the respective groups (clusters) in terms of public finance and regional economy.

With a deeper analysis (at the level of four standardized units of distance), the Sakhalin Oblast forms a separate (fourth) group.

The average value of a non-targeted inter-budgetary transfer from the regional budget in all RF subjects is above the median, with the exception of the Arkhangelsk Oblast (*Tab. 1*). Thus, the spread of transfers in the upper part of the row is higher than in the lower one. This is also evidenced by the positive coefficient of asymmetry. The negative kurtosis coefficient, characteristic of most subjects, indicates a relatively high spread of the specific value of grants.

Figure 3. Grouping of the analyzed Northern subjects of the Russian Federation



Note. Average distance by standardized indicators values. Analyzed indicators (2006–2015 data): parameters of public finances (expenditures, deficit and own budget revenues of a RF subject) and macroeconomics at the regional level (GRP per capita, average wage, unemployment rate, share of employment in state-owned organizations, share of population over working age, density of public roads paved). Primary indicators are presented in a comparable form, including with regard to the leveling of inter-regional differences through by the budget expenditure index (BEI).

Table 1. Descriptive statistics of the grant indicator (Gen.Grant) in Northern subjects of the Russian Federation

No.	Subject	Min	Max	Mean	Median	Standard deviation	Coefficient of variation	25-quantiles *	75-quantiles *	Interquartile range	Coefficient of kurtosis	Coefficient of skewness
1.	Arkhangelsk Oblast	0.0	5.6	2.0	2.1	1.5	0.73	0.6	2.9	2.3	-0.56	0.32
2.	KhMAO	0.0	44.1	11.4	8.1	10.6	0.93	2.5	16.5	14.0	0.75	1.10
3.	YaNAO	3.2	196.2	62.2	43.8	52.7	0.85	23.5	84.9	61.4	0.06	1.10
4.	Kamchatka Krai	1.0	137.3	46.4	36.0	35.3	0.76	23.9	57.9	34.0	-0.12	0.85
5.	Republic of Karelia	0.0	3.0	0.7	0.5	0.8	1.09	0.0	1.1	1.1	-0.08	0.99
6.	Republic of Karelia (excluding the anomalously high data for 2014)	0.0	3.0	0.7	0.5	0.8	1.08	0.0	1.1	1.1	-0.08	0.99
7.	Komi Republic (2006–2015)	1.2	14.9	7.2	6.9	3.1	0.44	5.0	8.9	3.9	-0.32	0.41
8.	Komi Republic (2013-2015)	1.2	14.9	6.9	6.3	3.4	0.50	4.8	8.1	3.3	-0.29	0.69
9.	Magadan Oblast	2.2	61.1	21.5	18.6	13.6	0.63	13.5	24.9	11.4	0.99	1.10
10.	Murmansk Oblast	0.4	46.8	11.4	4.8	15.2	1.33	0.6	13.8	13.2	0.34	1.35
11.	Republic of Sakha-(Yakutia)	0.0	87.7	36.7	35.6	20.0	0.54	26.9	47.0	20.1	-0.28	0.16
12.	Sakhalin Oblast	0.8	65.9	25.1	24.2	14.5	0.58	12.6	33.8	21.2	-0.14	0.50

Note. In comparable values (per capita at 2016 values (for the Komi Republic – 2015)), but without regard to inter-regional differences.
* 25-quantiles and 75-quantiles – an indicator value, which limits 25% (75%) of ascending values of the total (an indicator value x, not exceeding the probability of 25% (75%)).
** Interquartile range – difference between 75-quantiles and 25-quantiles, characterizes the spread of the value around the median.
Sources: Federal State Statistics Service of the Russian Federation (database "Indicators of municipalities"); author's calculations.

In the Republic of Karelia and the Murmansk Oblast there is a high variation in the amount of transfers to local budgets. In the Murmansk Oblast this can be attributable to occasional cases of transfers with extremely high values (a large difference between the average and the median). These subjects, along with the Arkhangelsk Oblast, are generally characterized by relatively small amounts of grants allocated by the regional budget of a relevant RF subject (indicator 25-quantile). Among these subjects the smallest proportion of transfers is allocated to local budgets of the Republic of Karelia.

Results

A model for coefficient estimation according to (3) by panel data is chosen according to the previously estimated parameters of panel regressions by means of the Hausman test (*Tab. 2*). The estimates based on the random effect model are more effective, but fraught with the appearance of shift coefficients.

The explanatory power of the constructed dependence equations is relatively high, with the exception of regressions in the republics of Karelia (according to nominal primary data), Komi (2013–2015) and Sakha (Yakutia) (*tab. 3*).

All the results with a negative regression coefficient for the grant variable (Gen.Grant) turn out to be statistically insignificant. Otherwise, it might indicate a negative fiscal stimulus for the recipient, a negative effect of inter-budgetary relations between regional and local budgets and a general loss of welfare.

In a large number of cases the impact of a transfer on costs is insignificant: the Arkhangelsk Oblast, KhMAO, the Komi

Table 2. Hausman test results by panel data of Northern subjects

No.	Subject	Chi square*	P-Value**	Choice of a panel regression model
1.	Arkhangelsk Oblast	37.502	0.000***	Fixed effect model
2.	Khanty-Mansi Autonomous Okrug	74.276	0.000***	Fixed effect model
3.	Yamalo-Nenets Autonomous Okrug	12.265	0.031**	Fixed effect model
4.	Kamchatka Krai	11.528	0.042**	Fixed effect model
5.	Republic of Karelia	3.262	0.660	Random effect model
6.	Republic of Karelia (excluding the anomalously high data for 2014)	7.000	0.200	Random effect model
7.	Komi Republic (2006–2015)	10.417	0.064*	Fixed effect model
8.	Komi Republic (2013–2015)	28.007	0.000***	Fixed effect model
9.	Magadan Oblast	8.440	0.134	Random effect model
10.	Murmansk Oblast	7.853	0.165	Random effect model
11.	Republic of Sakha (Yakutia)	64.804	0.000***	Fixed effect model
12.	Sakhalin Oblast	8.531	0.129	Random effect model

* Statistics (tabulated distribution) used in testing.
** The probability that it is necessary to use a method with random effects, in units.
Source: author's calculations.

Table 3. Panel regression coefficients (method (3))

No.	Subject	Regression model	Coefficient of *Payroll*	Coefficient of *Gen.Grant*	Coefficient of *PRICE*	Intercept term	R^2(norm.)
1	Arkhangelsk Oblast	Fixed effect[1]	1.16 (0.24)***	0.04 (0.03)	-1.03 (0.14)***	0	0.43
2	Khanty-Mansi Autonomous Okrug	Fixed effect	0.61 (0.32)*	0.002 (0.02)	-0.93 (0.27)***	0	0.66
3	Yamalo-Nenets Autonomous Okrug	Fixed effect	1.187 (0.50)**	0.193 (0.08)**	-2.61 (0.53)***	0	0.50
4	Kamchatka Krai	Fixed effect	0.75 (0.23)***	0.22 (0.06)***	-1.72 (0.23)***	0	0.57
5	Republic of Karelia	Random effect[2]	1.05 (0.47)**	0.16 (0.09)*	-2.28 (1.29)*	-1.29 (2.04)	0.17
6	Republic of Karelia (excluding the anomalously high data for 2014)	Random effect	0.57 (0.13)***	0.06 (0.02)**	-1.87 (0.27)***	1.33 (0.52)**	0.93
7	Komi Republic (2006–2015)	Fixed effect	0.87 (0.12)***	0.08 (0.04)**	2.84 (1.01)***	0	0.52
8	Komi Republic (2013–2015)	Fixed effect	1.15 (0.54)**	-0.03 (0.11)	-1.06 (3.62)	0	0.30
9	Magadan Oblast	Random effect	-0.21 (0.26)	-0.04 (0.06)	-0.99 (0.35)**	5.06 (1.14)***	0.72
10	Murmansk Oblast	Random effect	0.23 (0.25)	0.04 (0.03)	-0.64 (0.33)*	6.73 (0.94)***	0.81
11	Republic of Sakha (Yakutia)	Fixed effect	0.37 (0.11)***	-0.01 (0.02)	-1.12 (0.11)***	0	0.33
12	Sakhalin Oblast	Random effect	0.255 (0.14)*	0.15 (0.04)***	-0.76 (0.17)***	5.11 (0.77)***	0.77

[1] fixed effect method for municipalities of a relevant RF subject.
[2] random effect method, with the method to evaluate an instrumental variable developed by scientists P. Swamy and S.S. Arora.
In parentheses under the coefficient – a standard error.
* Probability of error of rejection of the hypothesis that the regression coefficient is equal to zero less than 10%; **less than 5%; *** less than 1%.
Source: author's calculations.

Table 4. Estimation of changes in expenditure due to changes in a factor unit: application (4) for the method (3)

No.	Subject	d*E*/d*Payroll*	d*E*/d*Gen.Grant*	d*E*/d*PRICE*	(d*E*/d*Payroll*) minus (d*E*/d*Gen.Grant*)	Note
1.	Arkhangelsk Oblast	2.64	0.00	-113.49	2.64	Insignificant impact of a transfer on expenses
2.	Khanty-Mansi Autonomous Okrug	0.14	0.00	-17.33	0.14	Insignificant impact of a transfer on expenses
3.	Yamalo-Nenets Autonomous Okrug	8.16	1.72	-1627.25	6.45	Impact of income on expenses is greater than impact of the transfer
4.	Kamchatka Krai	0.95	0.41	-191.14	0.55	Impact of income on expenses is greater than impact of the transfer
5.	Republic of Karelia	1.52	11.04	-126.31	-9.52	FLYPAPER EFFECT
6.	Republic of Karelia (excluding anomal data)	0.57	2.66	-71.37	-2.09	FLYPAPER EFFECT
7.	Komi Republic (2006–2015)	0.57	0.21	56.21	0.36	Impact of income on expenses is greater than impact of the transfer
8.	Komi Republic (2013–2015)	1.90	0.00	0.00	1.90	Insignificant impact of a transfer on expenses
9.	Magadan region	0.00	0.00	-241.87	0.00	Insignificant impact of a transfer on expenses
10.	Murmansk Oblast	0.00	0.00	-704.49	0.00	Insignificant impact of a transfer on expenses
11.	Republic of Sakha (Yakutia)	0.04	0.00	-6.49	0.04	Insignificant impact of a transfer on expenses
12.	Sakhalin Oblast	5.09	7.05	-1598.73	-1.95	FLYPAPER EFFECT

Source: author's calculations.

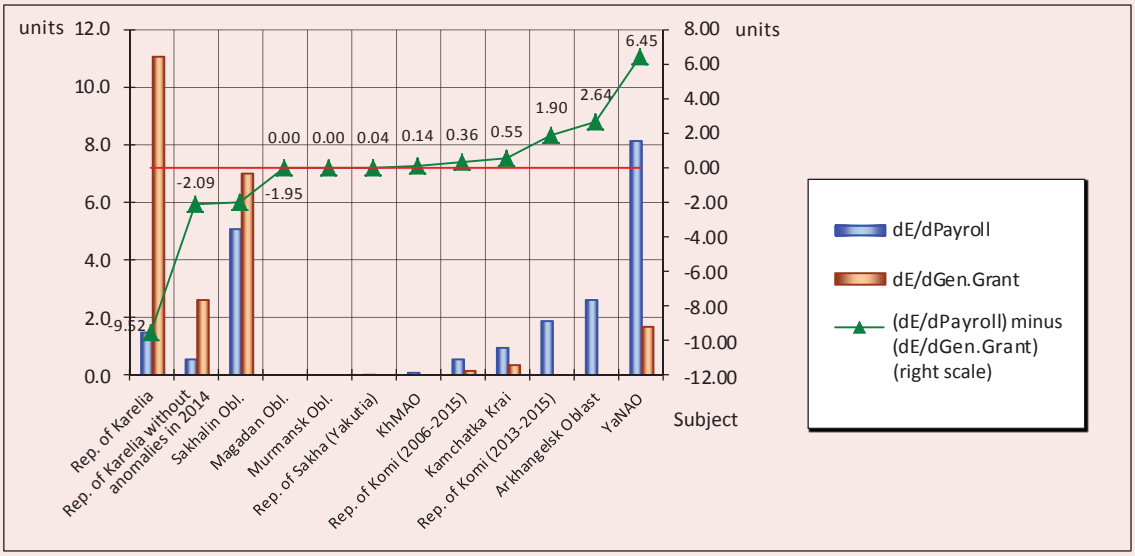
Republic (2013–2015), the Magadan and Murmansk oblasts and the Republic of Sakha (Yakutia); *tab. 4*). Accordingly, the flypaper effect is not observed here. As for the Magadan and Murmansk oblasts, it can be concluded that with a high degree of probability the forced narrowing of the observation period leads to the results close to insignificant in terms of their reliability.

The contribution of grants to the formation of local budget expenditures (considerable, but smaller in size compared to the contribution of a variable that acts as a private income indicator) is recorded in the YaNAO, Kamchatka Krai and the Komi Republic (2006–2015). Here, the flypaper effect is also not fixed.

For the Republic of Karelia (according to nominal initial and recalculated data) and the Sakhalin Oblast, the calculations reveal the presence of the flypaper effect in the relationship between the relevant budget of a constituent entity and local budgets.

The results for the Republic of Karelia allow us to conclude that taking the logarithm in the method to assess the flypaper effect decreases the error that may occur when working with initial data. So, the difference between the contributions of private income and a transfer, according to the calculations based on the adjusted initial data, is much smaller in modulus, than the result of the calculations based on the nominal data, obviously containing a specification error. The final index of the flypaper effect for the Republic of Karelia is comparable with that for the Sakhalin Oblast.

Figure 4. Change in budget expenditures due to changes in a factor unit



Note. Negative indicator of the value *"(dE/dPayroll) minus (dE/dGen.Grant)"* on the right scale of the graph indicates the presence of the flypaper effect. Ascending sort.

Source: author's calculations.

Inter-budgetary relations in the Arkhangelsk Oblast, Yamalo-Nenets Autonomous Okrug and the Komi Republic (in the latter case for both periods) are characterized by the prevalence of the contribution of revenues to local budgets' expenditure over the contribution of grants from the budget of a relevant RF subject to expenses (*Fig. 4*). For these subjects the prerequisites for the flypaper effect do not seem to be fulfilled.

Conclusion

The conducted analysis of inter-budgetary relations between the budgets of Northern regions of the Russian Federation and the corresponding local budgets of cities and districts allows us to formulate the following conclusions.

Fiscal incentives resulting from the relationship between the budgets of subjects and the budgets of cities and regions of the North, and behavior models, they form in the sphere of local budget expenditures, are different in various budget systems. The analysis of allocated regional non-targeted transfers, according to the indicator of flypaper effect presence/absence and the theory statements, indicate the presence of two groups of regional budget systems in the North of Russia:

1. Local budgets in the Republic of Karelia and the Sakhalin Oblast – the RF subjects with the identified flypaper effect in 2013–2016: participating in inter-budgetary relations with the relevant regional budget, they try to meet interests of this budget, are more ready to expand the production of local goods. The lack of authority and independence of local budgets is more pronounced here, local tax policy does not provide a tax burden level adequate to needs. Local demand is likely to be resilient: it increases in response to the growth of transfers, but at the same time, local budget expenditures are particularly inelastic due to the standardization of spending and limited tax powers. In this regard, the structure of inter-

budgetary transfers of the subject's budget in the Republic of Karelia and the Sakhalin Oblast deserves a separate analysis.

2. Local budgets without the flypaper effect in their inter-budgetary relations with the subject's budget – the Arkhangelsk Oblast, Khanty-Mansi and Yamalo-Nenets Autonomous okrugs, Kamchatka Krai, the Republic of Komi, the Republic of Sakha (Yakutia): they conduct a relatively more flexible fiscal policy, act in the interests of a local taxpayer to a relatively greater extent, but potentially at the expense of reduced production of regional goods. Perhaps, the structure of the transfers used provides for a certain degree of autonomy of local budgets, and local tax policy is relatively more effective.

The study significance is expressed in formulation of the following hypothesis, which requires confirmation in further studies. In the subjects with the identified flypaper effect there is a low (relative to other subjects) differentiation of local and regional costs, which prevents the realization of advantages of the division of powers and responsibilities in a decentralized system. There is a relatively high dissatisfaction with the current value of basic public sector services, which reduces the demand for local differentiation of budget expenditures.

The obtained results give an opportunity to conduct inter-regional research in several areas:

- a proportion of the importance of regional and local expenditures in a certain structure of regional political and tax systems;
- a decentralization degree of the budget system of a subject as a whole and in the context of expenditure items;
- a structure of budgetary expenditure;
- a structure of inter-budgetary transfers used.

The study significance is that we have found out that the reasons for the effect lie in the features of inter-budgetary relations, not fixed by traditional indicators of finance and regional economy. Thus, the presence of the flypaper effect in the inter-budgetary relations between a subject's budget and a local one is not affected by the proximity of RF subjects in terms of general indicators of public finance and regional macroeconomics and/or geographical proximity of territories.

The results of the analysis also allow us to formulate conclusions of a methodical nature:

1. The observation period and the availability of initial data play an important role in the analysis of inter-budgetary relations, since the conclusions for the Magadan and Murmansk oblasts cannot be formulated with an adequate degree of reliability.

2. Taking a logarithm in the method to assess the flypaper effect decreases the magnitude of a potential error made in the processing of primary data (case study of the Republic of Karelia). Thus, the evaluation method plays an important role in this kind of research.

3. The duration of the observation period plays a certain role in the calculations (case study of the Komi Republic), but does not significantly affect the overall conclusion.

4. The calculated nature of a grant size for the Komi Republic (use of an instrumental variable) and the leveling of inter-municipal differences might have played a role in the fact that the flypaper effect is not recorded. Thus, these techniques are important and relevant in the flypaper effect analysis and, especially, in the application of the method to analyze empirical data on the Republic of Karelia and the Sakhalin Oblast.

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The Environmental Culture in the Russian society as a Condition for Building Eco-Consciousness and Behavior of the Younger Generation

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Abstract. The environmental state largely depends on the environmental culture and consciousness of the population. The study of these qualities among the representatives of the younger generation is of particular interest: this has determined the relevance of the research problem. The purpose of the research is to compare the attitude towards pressing environmental issues among modern 16-year-olds and their peers interviewed 20 years ago, and to analyze the causes of changes that have occurred in the eco-consciousness and behavior of the younger generation during this period. The research lies in the following: the performance of 16-year-old teenagers' concerns about serious environmental problems and their environmental behavior is studied for the first time in two decades; the causes of changes (decreased attention of the state and the society to environmental issues; the school course "Environment" is no longer mandatory; the media do not pay attention to the issue of sustainable development) are analyzed. The study applies the method of questionnaires. In 1996, the survey was conducted in three, and in 2017 – in four Russian regions. The study shows that modern 16-year-olds, unlike their peers from the 1990s, less often note that people litter in the streets and in the countryside, throwing wrappers and other wastes (which indicates that the eco0culture has increased); however, their participation in environmental movements and organizations, as before, remains at an extremely low level. According to the data, despite the deepening environmental crisis, the share of adolescents expressing serious concern about important environmental problems has decreased over 20 years. In the light of the above, it is of great importance to educate the public on human ecology and develop school education on environment and sustainable

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development, whose objectives include building the younger generation that would understand the need to address environmental problems and reduce anthropogenic load on the environment, as well as developing skills to improve the environment.

Key words: adolescents, questionnaire survey, attitude performance, concern about environmental problems, eco-consciousness, eco-behavior, environment, harm to health.

Introduction. The increase in anthropogenic load on the environment has led to the globalization of environmental problems. Experts alarmingly note the increasing pollution of air, fresh water, oceans, and soil; deforestation, erosion and salinization of soils, their reducing fertility, desertification, sea level rise, biodiversity reduction and global warming. The increase rate of surface temperature has reached its highest levels in the past 600 thousand years due to a rapidly increasing concentration of carbon dioxide and other greenhouse gases [1, p. 31]. In 2015, the World Meteorological Organization stated that 14 out of 15 hottest years occurred in the current century[1]. More than 95% of climate researchers do not question global warming and a significant human contribution to this process[2].

The tense environmental situation makes it relevant to study the dynamics of eco-consciousness, eco-attitudes and eco-behavior of the population and separate socio-demographic groups. That is why in 2017, the Department of Social Health Issues of the Federal Research Center for Sociology of RAS (FNISTs RAN) repeated the study "Adolescent Health and Environment" conducted in 1996 [2, 3] (the author participated in the study in 2017). The applied methodological approach was the following: "The study of factors relevant from the adolescents' point of view" [3, p. 18]. The selection of cities and educational institutions was multi-stage, with the use of quota and random samples. The questionnaire method was used. The data were processed and analyzed in SPSS v23. At a 95% confidence limit the statistical error of the sample was 1.98. Descriptive analysis was used. Students from different types of educational institutions (secondary schools, gymnasiums, vocational schools and colleges) were interviewed. In 1996, the survey was conducted in three Russian regions: Moscow, Orenburg, and Abakan (1,004 people interviewed), in 2017 – in 4 regions: the Moscow Oblast, Nizhny Novgorod, Ulan-Ude, and Ulyanovsk (994 people). A comparison of these two surveys shows that adolescents' perception of most serious environmental problems has decreased over the past 20 years. Arrays of respondents in the past and present century differed significantly by age, so we compared the most numerous group of teenagers aged 16 in each survey (1996 – 266, 2017 – 290 people).

Research purpose: to compare the attitude to important environmental problems of modern 16-year-olds and their peers interviewed 20 years ago, as well as to analyze the causes of changes in the eco-consciousness and behavior of the younger generation during this period. Research novelty: for the first time in two decades, the dynamics of 16-year-olds' concern with serious environmental problems and their eco-behavior (we studied the aspect of behavior such as garbage disposal in the streets) and the causes of changes are analyzed.

[1] World Meteorological Organization: 2014 turned out the warmest year during the observation period. Available at: https://tass.ru/obschestvo/1738372 (accessed: 14.09.2018).

[2] Danilov-Danil'yan V.I., Piskulova N.A. *Sustainable Development: New Challenges*. Textbook. Moscow: Aspekt Press, 2015. P. 124.

Environmental degradation as a social problem. The deterioration of environment in the second half of the twentieth century is recognized as a social problem as it is largely due to human economic activity and has serious consequences for it. It is no accident that modern society was named a risk society [4], moreover, attention is focused on the anthropogenic risks [5].

In order to assess the impact of the population on the environment of a particular territory environmentalists use the indicator of its ecological footprint (EF) calculated in hectares of biologically productive land and water area necessary for production of resources consumed by the population, as well as for the absorption and storage of waste produced by them. Since 1975, the ecological footprint of earthlings has grown by an average of 14%. The average global demand for natural resources of an average modern human is 2.23 hectares. "Currently, however, the area of bioproductive land and sea on our planet is 1.78 hectares per person" [6, p. 32]. Humankind ES at the present stage is much higher than biocapacity of our planet, which is destructive to the biosphere. Thanks to the scientific and technological revolution people consume renewable natural resources at a rate that exceeds their capacity for self-reproduction. They alter the habitats of various species, destroying biocenoses that have existed there for millions of years. This is one of the main reasons why biological species have been dying out at an unprecedented rate in recent decades, and the average wild animal population has been steadily declining. By 2200, it may comprise 67% compared to the level of 1970[3].

In Russia, intensive use of natural resources in the twentieth century has led to serious environmental consequences. Forests have depleted, many small rivers have dried up, soil salinization and desertification in large areas has taken place, air, water and soils have become polluted. The example of our country in the past quarter of a century clearly shows the impact of ups and downs in economic activity and air protection activity on air pollution from stationary sources. In particular, it was decreased during 1981–1990 and 1991–1995, then the trend was oscillatory, with an increase in some years after 2000. In the first of these periods, the country's economy grew and the decline in emissions was due to the adopted air quality measures (switching from coal and fuel oil to gas and other measures). In the second period, economic activity decreased. Reduced emissions were observed in the crisis years of 1998–1999, 2008–2009, as well as in mid-2012 and 2014 where economic sanctions against Russia were imposed. Emissions stabilized or increased during periods of industrial output growth in some periods of the 1990s, the first decade and some subsequent years of the twenty-first century[4].

In Russian cities, air quality remains unsatisfactory although it is slowly improving[5]. The issue of its state requires careful monitoring. Scientists are concerned about lack of control over the flow of a number of toxic substances that affect ecosystems and human health in Russia. It is noted, for example, that legal acts in Russia "recording emissions from road transport do not contain information on the number of metal compounds and polycyclic aromatic hydrocarbons flowing into the environment during the operation of road transport" [7, pp. 298–299].

[3] *Living Planet Report 2016*. Available at: http://ekois.net/wp-content/uploads/2016/11/lpr_2016_summary_ru_net.pdf (accessed: 15.09.2018).

[4] On the state and protection of the environment in the Russian Federation in 2016: government report. Pp. 10–11. Available at: http://www.mnr.gov.ru/upload/medialibrary/49b/1-73.pdf (accessed: 15.09.2018).

[5] *Ibidem*. P. 15.

Environment deterioration, especially air, surface- and groundwater and soil pollution has a negative impact on human health. The International Agency for Research on Cancer emphasizes that the air we breathe is increasingly polluted by mixtures of carcinogens[6]. The World Health Organization (WHO) estimates that air pollution causes 7 million deaths per year[7].

The world community is trying to develop mechanisms for sustainable development on a global scale. Great expectations are associated with the "green economy"[8] [8, 9]. The Rio de Janeiro Earth Summit in 1992 adopted Agenda 21, which is "essential for the development of the international environmental policy"[9]. However, it is not always possible to come to an agreement. Even at the government level of some countries, there is no understanding of the importance of joint action. In particular, "the rigidity position of the US resulted in their refusal to ratify the Convention on Biological Diversity"[10]. In recent years, the escalation of international tensions has necessitated an increase in military spending and reduced the ability of the US to modernize production facilities to reduce discharges and emissions of toxic substances into the environment.

V.I. Danilov-Danilyan, an outstanding Russian environmentalist, believes that the opinion that "the problems of protection and preservation of environment suitable for the existence of the human race can be solved by technical means" is wrong [10, p. 9]. In his opinion, to preserve the natural balance it is necessary to clear the space for swamps, forests, stop polluting the ocean as humans cannot "replace the natural regulators of environment (this is justified by comparing the information flow through the system of living organisms in the implementation of the regulatory environmental function) with the information capacities of a civilization – those that it can develop in the remaining time before the environmental disaster" [10, p. 11].

Domestic and foreign researchers note that to ensure human development it is necessary to change the system of values, consciousness and attitude to the environment [11; 12; 13; 14]. In this regard, comparative studies on the transformation of eco-consciousness and behavior of the population are of particular interest.

Eco-culture in the Russian society as a condition for forming eco-consciousness and behavior of the younger generation. Environmental culture of an individual can be defined as a system of knowledge, values, social attitudes, needs, relations and motives regulating their interaction with the environment, which can be natural or destructive. The eco-culture of an individual is formed in the system of social institutions and norms of nature management developed in the society. Sociologists have low recognition of nature management in our country. In the context of economic liberalization, it led "to deplorable, barbaric use of natural resources, both on the part of new capitalists who do not want to invest in environment and impoverished population who has for many years survived at the expense of overexploitation of nature and dismantling technical life support systems" [15, p. 87].

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[6] *Outdoor air pollution leads to increased incidence of cancer.* Available at: http://ecoportal.su/news.php?id=74267 (accessed: 15.09.2018).

[7] *UN Environment Assembly: Actions on Ambient Air Pollution* (2014). Available at: http://www.unido-russia.ru/archive/num_14/art14_6/ (accessed: 15.09.2018).

[8] *Inclusive Green Growth: The Pathway to Sustainable Development.* The World Banc, 2012.

[9] V.I. Danilov-Danil'yan, N.A. Piskulova *Sustainable Development: New Challenges*. Textbook. Moscow: Aspekt Press, 2015. 336 p. P. 155.

[10] *Ibidem.* P. 156.

The survey of Russians on the quality of life shows that "clean environment (water and air quality)" is very important for them and is estimated at an average of 4.63 points on a scale from 1 to 5, while their satisfaction with this aspect of the quality of life is estimated significantly lower (average – 3.28)[11].

The study of people's attitude to environmental problems in the place of their residence shows that 66% of respondents are "very much worried" and "rather worried" about the environment in their place of residence. The share of the former significantly decreased in 2016 (17%) compared to 1990 (58%). In 2016 when answering the question about what was most disturbing about the environment in people's place of residence, 52% of respondents highlighted water pollution, 49% – air pollution, 31% – dirty polluted water, 25% – insanitation of the territory, 21% – climate change, 14% – deforestation, 10% – extinction of certain species of birds, fish, animals, plants, insects or changes in flora and fauna, 14% of respondents mentioned "the shallowing of water bodies, desert advancing and other water upsets". Moreover, 7% of respondents aged 18–24 mentioned poor hydrologic behavior, 13% – aged 25–39, 13% – aged 40–54, and 19% – aged 55 and over[12]. The older generation have witnessed significant shallowing of water bodies throughout their lives, which explains the higher share of those who are concerned about this phenomenon. Young people aged 18–24 have observed this process for a shorter period of time, that is why the share of those who are aware of this serious problem is lower among them.

As a rule, sociologists study the eco-culture of the adult population, which is important for characterizing conditions for socialization of the younger generation. Mass surveys of citizens in Russia reflect the state of their eco-consciousness and eco-culture which are transmitted in the process of intergenerational transfer of experience to children. The eco-culture of the modern Russian society is called consumer with predominant individualistic utilitarian attitudes. "The culture of general environment planning is replaced by consumer culture which forms negative trends in the general context of social development" [16, p. 4]. The eco-consciousness of the majority of Russians is characterized as environmental dependency and personal exclusion from problem solving. "The results of a sociological study demonstrate the predominance of consumer attitudes to ecology and environmental protection"[13]. Sociologists have came to a conclusion that the type of eco-culture predominant in our society is that "in which environment is perceived as a condition for a comfortable lifestyle, rather than an independent value"[14].

Relationships, social attitudes, eco-culture are pre-scheduled units with cognitive, emotional, and behavioral components in their structure. Different researchers focus on a particular component using different indicators. However, according to general opinion, the main criterion of ecological culture is behavior. Studies show that Russians demonstrate low levels of eco-activity. This applies both to personal participation (donation for environmental purposes, signing letters and petitions for environment protection,

[11] *Russia–2017: Quality of Life*. VTsIOM press release, 2017, no. 3498. Available at: https://wciom.ru/index.php?id=236&uid=116472 (accessed: 15.09.2018).

[12] *Environmental Issues*. Levada-Center press release, 2016, 03.06. Available at: http://www.levada.ru/2016/06/03/ekologicheskie-problemy (accessed: 15.09.2018).

[13] *Eco-Culture of the Russian Population*. VTsIOM press release, 2011, no. 1670. Available at: https://wciom.ru/index.php?id=236&uid=1763 (access: 15.09.2018).

[14] *Ibidem*.

prevention of violations of environmental standards in the micro-environment) and collective solidarity (activities of public environmental organizations, environmental groups in social media, participation in collective action, pickets and environment-related meetings) [17]. According to the survey of students of two Moscow universities, most of them understand that the environmental situation in the country is deteriorating, that this trend will continue in the future, and that the deterioration of environment in the capital has a negative impact on their health. At the same time, students are not much interested in the problems of environmental change, rarely use collective forms of its protection (public hearings, environmentalist actions, voting for parties with environmental programs). In everyday life, 62.3% of boys and 71.7% of girls save resources (water, electricity, etc.). Economic motivation prevails ("to pay less"), followed by personal eco-culture ("I understand that resources need to be protected") and family traditions [18].

The analysis of data of social surveys concerning the peculiarities of eco-consciousness and behavior of different age groups shows that young people, compared to older age groups, sometimes act less environmentally appropriate. For example, older respondents more often mentioned that they save energy everyday (73% of respondents aged 60 and over versus 25% of respondents aged 18–24)[15]. Although careful attitude to energy resources is mainly dictated by economic motives, in this case it is important that the share of those who save them is lower among young people.

Speaking about the relevance of environmental issues, experts proceed from the assessment of their consequences for humanity, for the environment and the biosphere. Each generation finds a new landscape which becomes a reference point for them. Eco-education can compensate for limited personal experience.

Eco-education at schools in our country is criticized. In recent years, there has been a decrease of cognitive interest in environmental knowledge among high school students compared with primary school students (from 67 to 27%) [19, p. 34]. It is emphasized that the result of traditional eco-education is schoolchildren's awareness of environmental problems, which "weakly correlates with practical actions to solve them, to reduce the negative anthropogenic impact" [20, p. 66].

Russian experts also note that "despite a number of attempts to introduce education for sustainable development...in Russian schools, it is not widespread, and even during the UN Decade has not gone beyond rare educational forums and round tables on thematic conferences" [21, p. 38].

The study of social attitudes of adolescents (end of the 20th century) in the field of ecology revealed the anthropocentricity of their consciousness, manifested, in particular, in relation to different ecosystems. It depended on the importance of ecosystems in meeting human needs, while their role in biosphere processes was not taken into account. Only 40% of high school students answering the question about what they value in nature, chose the answer symbolizing its inherent worth; more than half of respondents value its wealth that it gives us the most; almost as many answered that they have a rest in the nature. The survey showed that not all teenagers are familiar with the rules of environmentally appropriate behavior in the natural environment [23, pp. 140–141].

[15] *Energy efficiency and economical consumption of resources: who knows what's going on?* VTsIOM press release, 2015, no. 2980. Available at: http://wciom.ru/index.php?id=236&uid=115474 (accessed: 15.09.2018).

The development of eco-literacy (EL) of students is provided by the Federal State Educational Standard (FGOS) of general education. EL includes the assessment of environmental knowledge, the ability to apply it when performing training tasks and the ability to work with environmental information. The testing of high school students' EL in Moscow showed that they have successfully coped with about half of the test tasks (45.4%). Researchers were interested in the students' willingness to participate in solving environmental problems. It turned out that only 0.15% of respondents in the 10th and 0.39% in the 11th grade put themselves as the subject of solving these problems, 36.1–38.4%, respectively, considered that government bodies of different level are responsible for the majority of decisions, 28.6–32.4% – other people, 28.6–32.4% – enterprises and organizations, 18.3–20.7% – experts [22, p. 57].

Eco-culture, environmental awareness and adolescent behavior is an underdeveloped topic. The future of the biosphere depends on the eco-culture of the population, especially young people and adolescents; this determines the interest in the topic of the study.

Discussing the results of empirical research. *Table 1* shows the distribution of adolescents' responses to the most serious problems they consider to be threatening the world. It was proposed to choose the four most important problems and rank them on a scale from 1 to 4, where 1 is the most significant, 4 – the least significant. The list includes environmental problems such as pollution, including radioactive pollution, desertification, greenhouse effects, as well as the consequences of excessive consumption of natural resources (lack of resources, including the energy crisis). Moreover, the list includes threats associated with human aggression (war, crime and violence) and the imperfection of the social structure and wealth distribution (inequality between people, hunger). This combination of problems reflects the opinion of adolescents about the place of environmental threats in the system of various serious dangers that can undermine global stability.

Both in 2017 and in 1996 "war" was considered by teenagers as the main global threat ("the first problem"), the second was "radioactive pollution".

The "no answer" line provides information on issues that most respondents did not identify as the four most serious threats out of the 10 suggested in the question. The least relevant, according to adolescents, are: "energy crisis", "lack of mineral resources", "desertification (soil erosion)", "greenhouse effect" and "inequality". These problems, according to the results of both surveys, consistently take the last five positions in the "no answer" column, but today, compared to the 1990s, the share of respondents who did not choose them as very serious has decreased. This is especially relevant to "inequality" which in 1996 was not considered as one of the 4 serious threats by 81.6% of respondents, in 2017 – 59.3%, and "lack of mineral resources" (this threat in 1996 was not highlighted by 89.4% of respondents, in 2017 – by 75.5%). With regard to the remaining three threats, processes such as global warming, desertification and depletion of non-renewable resources are developing rapidly. The consequences may be very serious; those that already take place in other parts of the world, although the respondents do not yet feel them.

Teenagers of 1990s rarely considered pollution an important threat (this is understandable given the growth rates of pollutants in the environment over the past 20 years), war (perhaps the reason is that in the 1990s Russia was in a war against Chechnya), crime (apparently, this was affected by the rampant crime in our country in the past decade of the

Table 1. Opinions of 16-year-olds in 1996 and in 2017 on serious problems threatening the world (% to total respondents, R)

Problems threatening the world	Radioactive pollution	Hunger	Pollution	Rime and violence	Inequality	Energy crisis	Lack of mineral resources	Desertification (soil erosion)	Greenhouse effect	War
1996 (N=266)										
1st problem, %	25.2	8.3	10.5	14.3	1.5	0	0.8	1.5	2.6	35.7
R	2	5	4	3	7-8	10	9	7-8	6	1
2nd problem, %	16.9	16.9	13.9	23.7	3.0	0.8	1.5	2.3	3.4	16.9
R	2-4	2-4	5	1	7	10	9	8	6	2-4
3rd problem, %	14.3	10.2	13.2	24.8	6.8	2.6	2.3	6.4	4.1	14.7
R	3	5	4	1	6	9	10	7	8	2
4th problem, %	12.8	9.4	16.2	13.9	7.1	3.0	6.0	3.8	6.4	18.8
R	4	5	2	3	6	10	8	9	7	1
No answer, %	30.8	55.2	46.2	23.3	81.6	93.6	89.4	86.0	83.5	13.9
R	8	6	7	9	5	1	2	3	4	10
2017 (N=290)										
1st problem, %	23.8	11.4	14.8	10.7	7.6	1.0	2.1	4.1	1.0	29.3
R	2	4	3	5	6	9-10	8	7	9-10	1
2nd problem, %	11.7	15.9	22.4	22.4	5.5	2.8	9.3	6.2	3.8	11.0
R	4	3	1-2	1-2	8	10	6	7	9	5
3rd problem, %	11.0	13.1	19.7	19.3	11.7	7.9	5.9	3.4	6.9	6.6
R	5	3	1	2	4	6	9	10	7	8
4th problem, %	9.3	9.7	11.7	13.1	15.9	6.9	7.2	5.2	6.9	20.3
R	6	5	4	3	2	8-9	7	10	8-9	1
No answer, %	44.2	49.9	31.4	34.5	59.3	81.4	75.5	81.1	81.4	32.8
R	7	6	10	8	5	1-2	4	3	1-2	9

Source: author's calculations based on database of the Department of Social Health Issues of FNISTs RAN.

20th century), radioactive pollution (most likely at the end of the 20th century the most frequent were reminders about the accident at the Chernobyl nuclear power plant) were more often considered as threats.

The question about global threats revealed the views of adolescents on the danger of environmental problems against the background of other risks to humanity. The question of their concern about various environmental problems rank these threats in the respondents' opinion (*Tab. 2*).

According to the table, both in 1996 and 2017, "air pollution" was the biggest concern among adolescents, with "survival of animals and plants" ranking second. Problems such as "undisposable waste", "deforestation", and "water pollution" rank highest ("very concerned") in both surveys. In general, the ranking of problems of great concern has not

Table 2. Attitudes to various environmental problems of 16-year-olds in 1996 and 2017 (% of respondents; R)

Answers	Water pollution	Survival of animals and plants	Landscape destruction	Air pollution	Oil disasters	Undisposable waste	Nuclear power stations	Problems of increasing amount of waste, garbage	Construction of water reservoirs blocking rivers	Deforestation	Use of fertilizers and pesticides	Harmful effect of noise	Greenhouse effect
1996													
N	265	266	263	265	265	266	265	265	265	266	265	265	266
Very concerned, %	69.1	77.4	25.5	89.1	62.90	72.2	47.8	55.8	28.3	64.3	32.1	19.6	27.1
R	4	2	12	1	6	3	8	7	10	5	9	13	11
A bit concerned, %	25.3	17.7	41.4	9.4	22.3	16.9	32.5	33.6	36.6	26.3	32.4	34.3	30.0
R	9	11	1	13	10	12	5	4	2	8	6	3	7
Not concerned, %	2.6	1.9	17.5	0.4	9.1	4.5	9.1	5.3	17.7	1.9	15.1	36.7	25.6
R	10	11-12	4	13	6-7	9	6-7	8	3	11-12	5	1	2
Undecided, %	3.0	3.0	15.6	1.1	5.7	6.4	10.6	5.3	17.4	7.5	20.4	9.4	17.3
R	11-12	11-12	4	13	9	8	5	10	2	7	1	6	3
2017													
Number of respondents (n)	276	274	275	274	275	273	274	276	276	276	272	276	272
Very concerned, %	49.2	62.9	28.0	71.1	33.1	53.1	29.9	59.4	26.1	55.8	16.5	19.2	20.6
R	6	2	9	1	7	5	8	3	10	4	13	12	11
A bit concerned, %	37.7	28.8	37.1	22.3	39.6	25.3	33.2	26.8	35.9	31.5	29.0	25.7	32.7
R	2	9	3	13	1	12	5	10	4	7	8	11	6
Not concerned, %	9.1	4.7	26.9	4.0	18.9	13.9	30.7	7.6	28.6	9.1	39.1	43.5	27.6
R	9-10	12	6	13	7	8	3	11	4	9-10	2	1	5
Undecided, %	4.0	3.6	8.0	2.6	8.4	7.7	6.2	6.2	9.4	3.6	15.4	11.6	19.1
R	10	11-12	6	13	5	7	8-9	8-9	4	11-12	2	3	1

Source: author's calculations based on database of the Department of Social Health Issues of FNISTs RAN.

changed much in two decades. The differences between positions in ranks is no more than one or two positions, with the exception of three problems: "landscape destruction", "use of fertilizers and pesticides", and "increasing amount of waste and garbage". The first of these problems in the ranking of answers "very concerned" went up from the 12th position in 1996 to the 9th in 2017, the second fell from the 9th to the 13th, the third – went up from the 7th to the 3rd position, respectively.

Among the problems listed in Table 2 there are those where the difference in the percentage distribution of responses in 1996 and 2017 on the indicator "very concerned" is not so significant. These are the problems of increasing amount of waste and garbage (although this problem has worsened over the years), landscape destruction, the harmful effect of noise, and the greenhouse effect. For two decades, the situation for these indicators got worse, however, adolescents have not yet realized how serious these environmental problems are.

The analysis of data obtained twenty years ago shows that even then a significant share of respondents (we note that only groups of 16-year-olds were compared) were not sensitive about the problems specified in Table 2 way. About a quarter of adolescents were not very concerned ("a bit concerned" + "not concerned" + "undecided") about the reduction of biodiversity and undisposable waste, one third – about water pollution, deforestation and oil disasters, a half – about the increasing amount of waste and garbage, nuclear energy, two thirds – about pollution caused by the use of pesticides and fertilizers, three quarters – about greenhouse effect, landscape destruction, construction of reservoirs, dams blocking rivers, 80% of adolescents – about the harmful effect of noise.

In 2017, the share of adolescents with strong feelings ("very concerned") about 11 out of 13 environmental problems listed in the table decreased. The difference between the two surveys on the indicator "very concerned" about the indicators such as "oil disasters" (30%), "water pollution" (20%), "air pollution" (20%), "the problem of undisposable waste" (20%), "nuclear power plants" (20%), "use of fertilizers and pesticides" (15%), "survival of animals and plants" (15%) was impressive. These problems do not cause such a strong reaction among modern adolescents as they did among their peers 20 years ago. In 2017, compared to 1996, respondents were significantly more likely to choose the answers such as "a little concerned" and "not concerned", and the share of indifferent adolescents ("not concerned") increased significantly. There are several reasons. First, over the years attention to the environment by the state and the society has decreased. In the second half of the 1990s, state structures dealing with environmental issues were downgraded[16]. Currently, there is no separate agency for environmental protection or environmental issues in Russia. Second, the media pay little attention to social ecology and do not cover sustainable development. Third, in the 1990s much more attention

[16] The State Committee for Environment Protection of the USSR was established in 1988, the Ministry of Ecology and Nature Management of the Russian Federation – in 1991 (until December 25, 1991 – RSFSR). Based on this department in 1992 the Ministry of Environment Protection and Natural Resources of the Russian Federation was established, which in 1996 was split into the State Committee of Russia for Environment Protection and the Ministry of Natural Resources (the latter established on the basis of Committee of the Russian Federation for Water Management and the Committee of the Russian Federation for Geology and Use of Mineral Resources). In 2000, this Ministry was given the functions of the abolished State Committee for Environment Protection, as well as the federal Forestry Agency, the Committee for Land Resources and Land Management, and Federal service for Hydrometeorology and Environment Monitoring. In 2008, the Ministry of Natural Resources and Ecology of the Russian Federation was established on the basis of this Ministry.

was paid to environmental issues at school. In 1994, according to government decrees (1993) "Ecology" as a mandatory course was introduced in the curriculum for high schools. In the mid-90s, the requirements for the results of environmental education were formulated in the Temporary State Educational Standard of general secondary education (educational sphere "Ecology"). In the second half of the 1990s the situation changed. In 1998, the course for high schools in Russia was excluded from the federal part of the curriculum. Currently, "Ecology" in school is an additional optional course (high school students must choose a certain number of subjects among natural sciences). The results of the survey showed that 4–6% of respondents want to study "Ecology", "which roughly corresponds to the share of students engaged in various forms of environment-related extracurricular work and activities (5–9% in different regions)" [23, p. 23].

It was assumed that the teenagers' concerns regarding the environment are related to their experiences regarding health. This assumption was confirmed. In 1996, 34.2% of 16-year-old respondents highlighted that they are very worried about the harm environmental pollution causes to their health, 49.6% – that they worry about this enough, 3.0% – that they do not worry, 13.2% of respondents were undecided; in 2017 – respectively, 26.4 and 55.7% (worried, but not very much), 11.1 and 6.8%. The concern somewhat decreased. Both in 1996 and 2017 the extent to which adolescents are concerned about the effects of environmental pollution on their health and about the environmental problems listed in Table 2 were associated. For example, in 1996 73.4% of 16-year-olds who are very concerned about the harm caused to their health by environmental pollution were very worried about the increasing amount of waste and garbage; their share among those who were not very much concerned about the negative impact of environmental pollution on health comprised 52.6%, among those who did not worry at all about the negative impact of environmental pollution on their health – 28.6%. In 2017, these figures were 80.6%; 55.9% and 38.7%, respectively.

Some of the respondents are concerned about the environment only in words, some really understand the threats it poses to the biosphere and humanity. The most important thing here is whether concerns are expressed in deed. In 1996, 3.4% of 16-year-olds noted that they are engaged in activities of any environment protecting organization, in 2017 – 8.3%. Among them only 3 people were able to name the organization (one wrote "an Olympian", other – "school project", the third – "ground maintenance"). The absence of names of environmental organizations casts doubt on the participation of adolescents in their activities. Probably, they only mentioned their participation in some single events.

A person can make a contribution to preserve the environment not only by working in environment organizations or by promoting individual environment protecting actions such as cleaning up garbage. They can do this in their daily life, by following the eco-culture of proper environment-friendly behavior. The simpliest thing is throwing garbage in place designated places. In 1996, 15.8% of surveyed 16-year-olds said that they "never" threw away garbage (chewing gum, candy wrappers, cigarettes, cans), 65.7% of them did it "sometimes", 12.5% – "often" , and – 6.0% "almost always". In 2017, 34.3, 55.0, 4.8 and 5.9%, respectively. It is obvious that not all those who have declared their correct behavior stick to it practically, but the distribution of responses in 1996 and 2017 indicates the dynamics of socially approved and disapproved behavior patterns.

Conclusion. To sum up, sociologists pay little attention to the adolescents' eco-culture. The comparison of two surveys shows that, despite the deepening environmental crisis, the share of adolescents expressing serious environmental concern has decreased over the past 20 years. This is due to the reduced attention of the state and the society to environmental problems, lack of relevant information in the media and poor eco-education for children and adolescents. In the light of the above, educating the population for environmental issues, especially school education on environment and sustainable development is extremely relevant. The purpose of such education is to make children and adolescents understand the seriousness of environmental issues, the need to reduce anthropogenic load on the environment and develop skills to improve the environmental situation.

Modern teenagers unlike their peers from the 1990s rarely note that they throw away wrappers and other garbage in the streets, i.e. the cleaniness culture has improved. This shows that developing eco-culture is a problem possible to be solved. Eco-movements and organizations could play a major role here. However, the share of adolescents participating in their activities remains low (the share of respondents who said that they are members of environmental organizations although increased in 2017 in comparison with 1996 but, as a rule, respondents could not specify their name – most likely they participated in some separate single events).

The article compares a small set of respondents; however, data suggest the need for further study of the dynamics of eco-consciousness of adolescents and young people and the role of various social institutions in this process.

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Social Well-Being and Expectations of the Youth in the Industrial Region*

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Abstract. The article covers the social expectations of young people in a large industrial region of Russia in relation to their social well-being. The information framework of the article consists of results of a sample study conducted by the sociologists of Ural Federal University supervised by Yu.R. Vishnevsky in 2016 in the Yekaterinburg and Sverdlovsk oblasts. The survey sample includes 2,512 people aged 15–30, target quota sample was used, with quota signs such as employment (working, studying, and unemployed youth), age (young people of three age groups – under 20, 21–25, and 26–30) and type of settlement (residents of Ekaterinburg, other large cities in the region, medium or small towns, villages and urban-type settlements). The present paper raises the problem of studying the social well-being of young people, with a key factor being their focus on the future, their expectations and life strategies. Based on analysis

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of scientific concepts devoted to the population's social well-being, an important feature of the youth as a socio-demographic group is revealed: their focus on the future and a vast planning horizon. A reasonable assumption is put forward, which is partially confirmed by the survey results: the social well-being of young people largely depends on the established image of the future and assessment of their life prospects. Respondents confident in their future tend to be more positive about the present. Based on the survey data groups of young people are classified in terms of their attitude towards their life prospects: "the nowists" ("*now*"), "the optimistic", "the pessimistic" and "the patient". The problem of discussion the authors identify for the in the future is the following: young people with a clear image of their future who arrange their lives according to their life strategies demonstrate a better ability to social adaptation.

Key words: social well-being, life prospects, social expectations, socio-economic status, image of the social future.

Introduction. One of the indicators of effective socio-economic development of a region and assessing the quality of life is the well-being of various social groups and population strata. The choice of young people in the industrial region as the object of research is explained by several circumstances.

First, a shift from an industrial development model towards the post-industrial one had an extremely negative impact on the regions with highly concentrated industrial production and a large number of major enterprises [1, 2].

Second, the social damage paired with economic costs turned out to be significant. The traditional values of the youth such as receiving a degree in engineering and working in industrial enterprises became irrelevant [3]. In general, the risk of socio-cultural deformations increased, the mechanisms of cultural transmission were broken. As a result, young people faced the need to adapt and independently search for life priorities without relying on the positive experience of the older generation.

Third, young people are considered simultaneously as one of the most vulnerable social groups, at the same time having the potential to be a resource for the development of the whole society [4]. Consequently, the success or failure of the public policy has a direct impact on the well-being and expectations of young people.

In foreign social studies, studies of social well-being are traditionally conducted on the basis of the concepts of "social well-being" [5, 6, 7, 8], "quality of life" [9, 10, 11], "social happiness" [12, 13, 14]. English literature sources mainly contain the terms welfare, which is synonymous with the Russian equivalent of "well-being", and well-being. They are referred to as positive (joy, satisfaction, happiness) and negative (fear, anxiety, concern) states, but – most importantly – at the same time the social component of well-being is highlighted: a person's assessment of their life in relation to the situation in the society.

Despite the fact that social well-being is considered a subjective phenomenon within western concepts, it reflects people's real living conditions. Therefore, we can confirm the fact that the use of results of social well-being in social cognition in the West has already "become a social standard, and the basis of the methodology of social research is not just a description of vital problems, their layering, people's anxiety and concerns, but analysis of government performance and domination of priorities approved in the society" [15, p. 11].

Russian literature on Sociology contains a significant number of works devoted to the

study of social well-being and expectations of young people [15, 16, 17]. The central research topics of social well-being are aspects such as social adaptation [18, 19, 20], social activity and tension [21, 22], as well as factors that form deviant behavior of low-resource subgroups of the younger generation [23, 24, 25]. In an attempt to group the author's concepts one may come to a conclusion that all of them are based on analysis of people's subjective assessments of their position in the system of social inequality.

However, despite the variety of research works, there is still no holistic concept that would reflect the relations between social expectations and the well-being of young people, as well as explain the degree of their mutual influence.

In light of this, the purpose of the article is to conceptualize the relations between the expectations of young people and their social well-being. The applied objective is to study the degree of satisfaction of young people with various aspects of social reality, their living conditions, as well as to track the relations between young people's focus on the future and their current state of health on the example of the industrial region.

Theoretical and methodological framework of the research

In modern science there are two theoretical approaches to the study of social well-being: sociological and psychological. For a long time the methodology of "social well-being" was dominated by the psychological approach (Gritsenko, Kolomiets, Krupets, Shalamova). It is based on the study of social well-being as an individual or group phenomenon. Social well-being is considered a socio-psychological state of an individual or a group. Although it arises the influence of objective life circumstances, the measurement of the subject's sensory-emotional and cognitive spheres remains the center and subject of analysis [34].

Drilling through the theory of social well-being was the result of the development of sociology in the post-Soviet period, the search for new grounds explaining the turbulent social processes. "The subjective perception of a person's own life has ceased to be the focus of solely psychological research due to the significant influence of objective factors largely determining the life of both the individual and social communities" [26, p. 50].

The analysis of the interpretation of the concept "social well-being" in the framework of the sociological approach shows a wide range of interpretations of this phenomenon (Rubina, Toschenko, Kharchenko, Petrova). In one of the first sociological works dedicated to this issue E.V. Davydova defines social health as "satisfaction with individual aspects of life: family, household, employment, leisure, socio-political, socio-economic, and socio-cultural" [27, p. 14]. This definition was later specifies and expanded depending on the author's vision and the subject field of a particular study, but its basis – the category of satisfaction – remained unchanged [28, 29, 30].

N.I. Lapin, defining social well-being from the axiological approach draws attention to its correlation with the context of the present conditions and the focus on the future: "Social well-being is people's subjective perception of meanings of their life here and now, in the context of the past and the expected future. It is their value-emotional attitude to their social status and degree of satisfaction with their needs and interests"[1]. However, Lapin considers the degree of optimism in assessing the future only

[1] Yasin E.G. (Ed.). Lapin N.I. Basic Values, Social Well-Being and Trust in Government Institutions. *V International scientific conference "Economic Modernization and Social Development"*. In 3 volumes. Moscow: GU-VShE, 2007. Volume 2. Pp. 210–219.

as one of the components of social well-being, while the image of the social future of young people as a holistic phenomenon is closely linked with their subjective perceptions and sense of events and conditions of the present.

In our opinion, the essence of the sociological approach to studying social well-being is revealed through analyzing this category at the macro- and micro-levels of the social system simultaneously, namely, in the interaction of objective factors and conditions of life and their subjective perception (refraction) in the consciousness of an individual and a social group. The second important point determining the specific features of sociological analysis of social well-being is consider a social community or group, in particular, young people as a subject of well-being.

It is known that the status of young people in the system of social inequality is considerably uncertain [31]. For a young person the position in the life cycle is associated with the ability/inability to successfully accumulate and realize their potential. Therefore, subjective assessments of youth satisfaction with certain aspects of life are of a projective nature. Social expectations and the image of the future formed on their basis play a significant role in these evaluations.

Thus, our understanding of social well-being comes from the fact that for young people it is largely determined by the image of the social future formed in their minds, the most important component of which being social expectations. Social expectations are formed based on young people's assessment of opportunities to apply their potential in the current and specific social situation. Therefore, we can assume that there is feedback between well-being and expectations: young people's strategic behavior, that is, behavior focused on the future, is developed taking into account their satisfaction with specific living conditions here and now. Respectively, young people's choice of life, professional, educational and other strategies depends on their current state of health.

Based on the correlation between social well-being and expectations we can distinguish several types of young people's social attitudes according to their attitude to the future and their position in the present. Traditionally, sociology and social psychology distinguish a group with an optimistic attitude – the so-called "optimists" characterized by a positive perception of these events and a high assessment of life prospects. The group with the opposite mood – "pessimists" – is susceptible to negative feelings towards the present and future [32]. We believe that this classification is not complete and does not cover the whole range of young people's possible attitudes. Today, a number of sociologists refer to the spread of "nowism" as a rejection of thoughts about the future, an attempt to live in the moment [33]. Moreover, we also distinguish another type of sentiment – the "neutral-patient" youth characterized by a fundamentally different emotional state: they accept the events as they are, willing to tolerate their negative consequences.

The research is based on the understanding of social well-being as a system of young people's subjective assessments of their prospects and opportunities for implementing life strategies. The structure of social well-being includes both objective factors and living conditions, and people's subjective states.

Objective factors include environmental, political, economic, socio-cultural parameters of the living environment. They act as an institutional context for the functioning of subjective states and largely determine these states, being refracted in the system of values of social actors.

Subjective states include young people's satisfaction with the current conditions of their life: socio-economic status, including financial, housing and living conditions and prospects to improve them; the opportunities for education and raising its level; opportunities for employment, career and self-realization. According to the main hypothesis of the research, these components are associated with the social expectations of young people. These subjective components of social well-being determined the main blocks of our empirical research.

Data and method

The article uses materials of an empirical sociological research "Social well-being of the youth in the Sverdlovsk Oblast" conducted in November 2015–January 2016 and supervised by Yu.R. Vishnevskii and with the participation of the authors. 2,512 people aged 15–30 were surveyed using the method of questionnaire, the target quota sample was used, quota characteristics being employment (working, studying and unemployed youth), age (young people of three age groups: under 20, 21–25 and 26–30) and type of settlement (residents of Yekaterinburg, other large cities of the region, medium and small towns, villages and urban settlements).

The age quotas are based on the key aspects of young people's self-identification: under 20 – the period of primary self-identification at work or education (high school graduation, admission to educational institutions or going to work); 21–25 – for most young people it is the period of graduation from a college or a university, entering the labor market (job search, primary employment), 26–30 years – the period of accumulating social and professional experience, starting a family, self-identification in the family and household, changing life priorities. Age turned out a significant factor determining the social well-being and young people's image of the future.

The survey covered young people living in Yekaterinburg (44%); in other large cities of the region (25%); in medium and small towns (24%); in rural settlements (7%). It actually repeats the distribution of young people in the Sverdlovsk Oblast by residence. When forming the sample, it was assumed that apart from age, the respondents' social attitudes and expectations will be influenced by the place of residence. However, there was no statistically significant correlation between the respondents' place of residence and social well-being and expectations.

Empirical data were processed and analyzed through Vortex 10 program for processing and analysis of sociological and marketing information.

Research results

The research demonstrates that optimism is predominant among the respondents: 45% believe that the situation in the country will improve in the future. Young people generally have a positive view of the social future and therefore there are no age differences in responses. However, it is not wise to interpret such responses as a purely positive assessment of the current state of affairs. On the contrary, it indicates a request for change, yet delayed. Young people, on the one hand, show that they expect changes, on the other hand, they still have a certain amount of patience *(Table 1)*.

Although optimistic young people predominate, it is worth saying that the youth environment is highly differentiated based on the attitude to future prospects.

The next group of respondents has completely opposite optimistic expectations of the future. They are tired of waiting for changes (14%), their sentiment is determined by fears that the situation will only get worse. Neutral

Table 1. Sentiment and expectations of young people of different age groups, %

What are your current moods and expectations?	Age			
	Under 20	21–25	26–30	TOTAL
I think the situation in the country will improve ("optimists")	42	51	48	45
I do not expect any significant changes, I can wait a bit more ("the patient")	12	17	16	14
I am tired of waiting for changes, I fear that the situation will only get worse ("pessimists")	15	9	17	14
The best thing is to live for the present, not to worry about anything ("nowists")	29	19	17	25
Undecided	2	4	2	2
TOTAL	100	100	100	100

Table 2. Satisfaction with financial status among various age groups pf young people, %

To what extent are you satisfied with your financial status?	Age			
	Under 20	21–25	26–30	TOTAL
Completely satisfied	15.0	6.1	4.5	11.5
Rather satisfied than not	37.7	25.7	28.5	33.2
Rather dissatisfied	29.0	47.7	45.5	35.6
Not satisfied at all	15.4	20.5	21.1	17.5
Financial satisfaction index*	+0.08	-0.36	-0.33	-0.08
TOTAL	100	100	100	100
* The index is calculated as the difference between respondents' positive and negative responses divided by 100.				

estimates are typical for the same share of respondents – 14%. At the same time, it should be borne in mind that this group does not have any clear feelings about the future and can join the group of "optimists" of "pessimists" depending on the events.

A phenomenon of special attention is the nowist attitudes of young people. The life focus on "here and now", without obsessing about the future, building life plans, are quite typical for all age sub-groups of young people (25%). However, they are particularly evident among younger age group (29%). They are least common for young people aged 26–30 (17%). Apparently, as young people grow older, socialize and form more complex social relations they overcome the nowist attitude and gain the necessary experience in life planning. Accordingly, with age young people move from the category of "nowists" to groups with other social attitudes and expectations concerning the future.

The core of social well-being is the satisfaction with various aspects of life. Material well-being and socio-economic status form the basis of satisfaction (*Tab. 2*).

We can trace a trend: in the younger age group (under 20) the satisfaction with financial status is higher than among older ones. The socio-economic status (SES) of this age group of young people is still determined by the current socio-economic status of their parents. As a rule, the respondents of this group live in a parent family, hence, a more relaxed attitude to the material aspects of life. In turn, young people aged 21–25 who enter adulthood are forced to build their own SES, competing in the labor market. At the same time, we assume that they still enjoy the financial support from their parents and, in some cases, living with them. Dissatisfaction with the financial status among young people aged 26–30 is associated with marriage, starting a family, the need to provide for it. They do not possess enough professional

capital to achieve the desired income level. In professional terms, they are at the beginning of the road facing the challenges of career development.

The study reveals that the satisfaction with the current financial status of young people is associated with their sentiment and expectations of the future (Cramer's V – correlation between the corresponding variables was 0.125, significant). The results of correlation are presented in *Table 3*.

The highest degree of satisfaction with financial status is marked in the group of young people who believe that it is better to live for the present. The nowists are satisfied with their current financial status and do not want to think about the future, which is probably due to their relatively carefree existence.

Young people who expect the current situation on the country to improve also demonstrate high assessment scores, yet they are somewhat lower than those of "nowists". Young people who do not expect any changes in the future but are ready to wait a bit more are not satisfied with their financial status (in this group, the answer "rather dissatisfied" prevails – 62%).

Pessimistic respondents are the least satisfied with their socio-economic status. They are not at all satisfied with their financial status (33%) and do not see any prospects for its improvement, on the contrary, they expect reduced opportunities for improving their socio-economic status in the future.

In addition to satisfaction with the financial status we measured parameters of social well-being such as satisfaction with education and training (*Tab. 4*).

Table 3. Correlation between sentiment and expectations of young people and satisfaction with their financial status*, %

To what extent are you satisfied with you financial status?	Predominant sentiment and expectations			
	Optimists	Nowists	Patient	Pessimists
Totally satisfied	10	15	6	12
Rather satisfied, than not	36	37	15	24
Rather dissatisfied	39	35	62	31
Totally dissatisfied	15	12	17	33
TOTAL:	100	100	100	100
* Cramer's V [0..1]: 0.125, significant.				

Table 4. Satisfaction with quality of current (acquired) education and professional training of different age groups of young people, %

Are you satisfied with the quality of your current (acquired) education?	Age			
	Under 20	21–25	26–30	TOTAL
Totally satisfied	27	16	19	23
Rather satisfied, than not	52	45	53	49
Rather dissatisfied	17	31	24	22
Totally dissatisfied	4	8	4	6
TOTAL	100	100	100	100
Are you satisfied with the quality of your current (acquired) training?	Age			
	Under 20	21–25	26–30	TOTAL
Totally satisfied	22	14	16	19
Rather satisfied, than not	45	45	50	46
Rather dissatisfied	19	33	23	23
Totally dissatisfied	5	6	3	5
TOTAL	100	100	100	100

The degree of satisfaction with the quality of current or acquired education reflects age-specific features. The representatives of the youngest age group (under 20) are the most satisfied, that is, they are mostly respondents who are in the process of acquiring education (high school students, college and junior college students). In this case, their satisfaction/dissatisfaction with the quality of education is associated assessing the opportunities for admission to colleges and universities. The satisfaction of the older age group (26–30) is somewhat lower: these respondents already work, have experience in employer-employee relations and compare their education with the requirements of production and business.

It is no coincidence that the least satisfied with the quality of education are young people aged 21–25 who are at the stage of transition from the educational stage to the labor stage. For them the issues of job search and employment, first experience of applying knowledge and skills acquired in an educational institution are most relevant. The respondents of this group are "face to face" with the problem of the employer's assessment of the quality of their education. According to a number of sociological studies, the major claim of young people is that the content of education does not correspond with the employers' requirements [4, 17].

The satisfaction with the quality of education significantly correlates with the satisfaction with the quality of training (Cramer's V – 0.135, significant). This confirms the conclusion that young people assess the quality of education in the context of its applicability on the labor market.

The satisfaction with the quality of current or acquired training has similar age peculiarities (see Table 4). Young people under 20 who do not yet have professional experience are the most satisfied; the least – young people aged 21–25 who are actively searching for their place in the labor market. Our study once again confirms the fact that the "gap" between vocational education and the labor market, which has long been talked about by sociologists [32], is still relevant.

Both variables (satisfaction with the quality of education and satisfaction with training) correlate with the sentiment and expectations of young people (*Tab. 5* and *Tab. 6*).

In general, the respondents, regardless of their sentiment about the future rather are satisfied with the quality of the current (acquired) education than not satisfied, although the share of those whop are dissatisfied with education in varying degrees is significant: it ranges from 23% among young people who want to live in the moment to 43% among the pessimistic young people. The satisfaction with

Table 5. Satisfaction with the quality of current (acquired) education depending on social attitudes and expectations of young people*, %

Are you satisfied with the quality of your current (acquired) education?	Predominant sentiment and expectations			
	Optimists	Nowists	Patient	Pessimists
Totally satisfied	23	24	9	16
Rather satisfied, than not	51	53	63	41
Rather dissatisfied	21	22	22	28
Totally dissatisfied	5	1	6	15
TOTAL:	100	100	100	100
* Cramer's V [0..1]: 0.123, significant.				

Table 6. Satisfaction with the quality of current (acquired) training depending on social attitudes and expectations of young people*, %

Are you satisfied with the quality of your current (acquired) training?	Predominant sentiment and expectations			
	Optimists	Nowists	Patient	Pessimists
Totally satisfied	20	26	9	14
Rather satisfied, than not	48	49	54	49
Rather dissatisfied	26	23	34	25
Totally dissatisfied	6	2	3	12
TOTAL:	100	100	100	100
* Cramer's V [0..1]: 0.112, significant.				

the quality of training is approximately at the same level: the share of dissatisfied (fully or partly) is 25% among nowists young people and 37% among pessimists and young people who are ready to "wait".

However, further analysis of satisfaction shows differences according to the identified attitudes and expectations of young people.

The nowists are most satisfied with the quality of education, just like in the case with financial status. The group of optimistic young people is close to it. More cautious assessments of the quality of education is expressed by young people who are patient: their answers are shifted to the middle of the satisfaction scale ("rather satisfied than not" or "rather dissatisfied"). Young people who are pessimistic about the future assess the quality of education more radically: they have the highest share of those dissatisfied with the quality of education (15% are not satisfied at all and 28% are rather dissatisfied).

It is interesting that a similar pattern is observed in the assessment of satisfaction with the quality of current (acquired) training (see Table 6). The nowists are also the most satisfied with it (nowists – 26 and 49%).

The optimistic youth are to a lesser extent, but quite substantially satisfied with it (20 and 48%). In two other groups of young people the satisfaction with the quality of training is much lower.

If we divide the answers of "pessimistic" and "patient" young people into two poles – positive and negative – the number of those satisfied and dissatisfied is equal in both groups: the share of satisfied to some extent in each group is 63%, and dissatisfied – 37%, respectively. But those who fear a negative scenario of the future tend to extreme estimates (they answer "totally satisfied" or "totally dissatisfied" more often than "patient"), while young people willing to wait a bit more, again, as in the case of satisfaction with the quality of education, takes a somewhat uncertain position: they choose answers from the middle part of the scale – "rather satisfied than not" or "rather dissatisfied" more often than respondents from other groups.

Thus, based on empirical analysis of the correlation between social well-being and expectations we confirm the existence attitudes for the future and positions taken in relation to the present among young people such as "nowism", "optimism", "pessimism", and "patience". Let us provide a generalizing characteristics of these groups.

1. "Nowists". There were quite a lot of them – a quarter of respondents. Nowists are a group most satisfied with their financial status, quality of education and quality of training. It would seem that they form a group of people with the most adaptive social well-being. However, the refusal to plan reduces

the transformation activity of this group. Given that nowists' attitudes are most evident among young people under 20 it is reasonable to assume the marginal nature of this group. In the process of their its self-identification – social, educational, professional, and family-household – it is possible that it will "shift" towards groups with other attitudes – "optimistic", "pessimistic" or "patient". Here, the result will largely depend on objective opportunities for self- identification provided by the society.

2. "Optimists". This group has a positive attitude, which is quite typical for young people so they constitute a great share in the sample – 45%. At the same time, optimists are characterized by a high degree of satisfaction with indicators of social well-being. Although their assessments of the present is not as positive as those of nowists. Some expectation takes place, the intention to change the social reality for the better. This is where the potential of this group lies.

3. "Pessimists" (14%) are afraid that the situation will become worse in the future, they do not see any positive prospects and therefore they are the most dissatisfied of all groups. Nevertheless, their negative potential can be a source of activity to change it for the better. It is known that critical attitude is the first step to change the situation.

4. "The patient" is a special category of young people (14%). On the one hand, they are characterized by negative assessments, dissatisfaction with the current situation, although it is somewhat "smoothed" compared to "pessimists". On the other hand, they focus on preserving this negative situation. In our view, their willingness to wait reduces the transformation potential of this group of young people.

Conclusion

Summarizing the analysis, we come to the following conclusion. The social well-being of young people in the industrial region measured by three parameters – satisfaction with financial situation, satisfaction with the quality of current (acquired) education and training – is interrelated with their social expectations and sentiment. Thus, the theoretical hypothesis about the dependence of social well-being and expectations is confirmed.

The correlation between expectations and well-being is rhizome or reversible. On the one hand, young people's vision and perception of their prospects, positive or negative, or refusal to see any prospects determines their subjective perception of their current socio-economic, educational, and professional status. On the other hand, young people's emotionally colored assessment of the current situation, their current self-perception in the society can influence, or rather, enhance the positive or negative attitude to the future.

Studies show that young people's assessments of prospects for the future and the current state of affairs are heterogeneous. We were able to distinguish four groups of young people with different sentiment and expectations associated with different levels of satisfaction with the current situation, different social well-being: "nowists", "optimists", "pessimists" and "the patient". Such types are typical for the youth of the industrial region. The location of research objects is the Sverdlovsk Oblast which is among typical industrial regions of Russia with a large number of industrial enterprises, operating educational engineering centers, and a significant share of young people engaged in industrial production. We assume that the presence of the selected types and their share

may vary depending on the regional economic and social characteristics. From our point of view, this subject can be the core of further comparative regional studies.

The most favorable assessment of social well-being by "nowists" involves lack of any focus on the future, refusal to assess the prospects and the desire to live the moment. The two distinguished groups, optimists and pessimists, are opposite in their assessments of both their future and the current situation. However, in our opinion, what they have in common is their transformation potential based on a caring attitude to reality and the desire to change and improve social reality. The negative attitude of "the patient" combined with the willingness to tolerate the existing state, on the contrary, reduces their value as a resource for constructive change.

The distinguished types help both to fix them as a theoretical model and promote further discussions and studies devoted to the image of young people's social future. Nevertheless, the highlighted categories of young people can serve as a framework for further theorization in personal sociology and deepening of the axiological aspect of the subject.

Of course, comparing the various parameters of young people's social well-being with their expectations, we understand that social well-being includes a wide range of characteristics and is not limited to parameters covered in the article. We see analysis of social well-being as a complex phenomenon and a complex nature of its correlation with young people's sentiment and expectations as a further prospect for research.

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On the Transformation of the Models of Interaction between the Authorities, Mass Media and Society in Regional Print Editions*

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Abstract. The article describes the transformation processes that form the models of information interaction between the authorities, mass media and society in modern Russia. During the Soviet period, the activities of the media in the USSR were determined by the state, which shaped public consciousness in the country with the help of canonical ideological attitudes. By the early 1990s, the model of state domination over society was transformed into a new socio-political state – the domination of society over the state. The transformations also affected the activities of Russian mass media, which made a full turn by the beginning of the 21st century and returned to their original information and communication position. Genetic (state) nature again prevailed in the work of Russian mass media, which determined the formation of a hierarchical model of interaction between the authorities, mass media and society. These processes prove the need for active participation of power structures in the communication and information space of the country, which needs regulation and self-regulation with the help of evidence-based state information policy. We analyze the transformation processes under consideration with the help of several methods: structural and functional analysis, comparative analysis, reconstruction of the addressee of the media text, and some aspects of content analysis. The model of interaction between the authorities and the media affects the formation of the society of small towns, establishment of a positive information field, and identification of the population. We carry out the study on the materials of district newspapers of the Vologda Oblast. Our findings proceeding from the analysis of the current model of information interaction reveal its flaws, which is due to its monologue nature, alleged naturalness of national-civil identification, and creation of the image of the addressee with the identity of naive subject.

Key words: information policy, information interaction model, mass media, power, society, media.

Introduction

Scientific and political community takes special interest in the analysis of theoretical bases and factors in optimizing models of interaction between state bodies and the mass media.

The research in mechanisms and models of the dialogue "power-society" can help assess the effectiveness of interaction between state and civil structures and identify the existing contradictions and factors hindering this process.

In the conditions of modern socio-political space the issues of sustainable and stable development of the state are of particular importance. One of the factors to maintain the balance between authorities and emerging civil society is the communicative environment, where state bodies exercise their powers. The dialogue between authorities and society is one of the basic values of the modern state, a regulating and system-forming factor of socio-political reality.

The problems of interaction between the public authorities, media and society are reasonably reflected in the works of foreign and domestic authors working in different scientific fields: political science, sociology, journalism, national history, psychology, social psychology.

If we focus on domestic researchers' recent works in this sphere, we can see a significant diversity in the coverage and solution of the issue of information interaction between government and society.

A.A. Zinov'ev, A.S. Panarin, S.G. Kara-Murza touch upon the problem of interaction of the power, media and society institutions at the theoretical and philosophical level [1-3].

A.A. Grabel'nikov, I.I. Zasurskii, Ya.N. Zasurskii, L.M. Zemlyanova, E.P. Prokhorov, M.V. Shkondin, I.I. Yuzvishin, S.G. Korkonosenko, A.I. Solov'ev, M.V. Shkondin, L.G. Svitich[1], S.V. Konovchenko, A.G. Kiselev dedicate their work to the analysis of communication processes (social, historical, modern) and the study of the mass media functioning, as well as the theory and practice of journalistic activities [4-11].

The pragmatic potential of the media in the context of socio-political and economic reforms is studied G. Diligenskii, M. Gorshkov, I.N. Tarasov [12-14].

Recent research is focused on the problems associated with a transforming political system of the modern Russian society and activities of the media in the context of political and economic reforms. N.R. Balynskaya, A.V. Bondar, E.V. Brodovskaya, E.V. Galkina, S.P. Potseluev, V.V. Kravtsov, S.S. Bodrunova are interested in this issue[2].

A significant amount of work is devoted to the role and importance of the media in the formation of a new political system in Russia. This is evidenced by a number of collective monographs, collections of scientific papers, as well as dissertations on this topic. For example, the most complete scientific analysis of the presidential elections of the Russian Federation in 1996 is carried out by a group of authors representing academic scientific organizations [15]. This topic is reflected in the works of scientists, such as V.M. Yur'ev, D.G. Sel'tser [16].

Processes of the RF electoral system formation, issues of its improvement and results of its impact on the country's transformation, as well as the use of mass media in the elections are considered in the studies of well-known foreign political scientists and specialists, such as M. McFall, D. Simon, E. Schneider [17-19]. Methods of detecting the ideological content of mass media messages during the elections are considered in the work of English sociologist John. B. Thompson [20].

The transformation processes that occurred in the media field and influenced the formation of a new system of mass-media are reflected in the work of M.Yu. Galkina, K. Lekhtisaari [21].

However, in our view, academic studies lack works devoted to the study of communicative-informational relations between the state and society and those transformational processes that occur in the Russian mass-media. This indicates the presence of some gaps in theoretical research on this issue. The article is devoted to the study of the causes and factors that form current transformational changes in the models of interaction of the government, media and society.

In the Soviet times the country had a hierarchical model for government-media interaction, they were under the ideological control of the CPSU. This dependence allowed the authorities to use the media as a tool of domination over the society, forming public consciousness through the introduction of ideological attitudes.

[1] Svitich L.G. *Journalism in the System of Global Information-Creation Processes: Doctor of Philosophy dissertation*. Moscow, 2002. 324 p.

[2] Balynskaya N.R. *Specific Feature for Media Participation in Political Processes in Modern Russia: Doctor of Political Science dissertation abstract*. Ekaterinburg, 2009. 34 p.; Bondar A.V. *Strengthening State Institutions as a Factor in Consolidation of the Russian Society: Doctor of Political Science dissertation*. Saratov, 2009. 423 p; Brodovskaya E.V. *The Transformation of the Political System of Modern Russian Society: Institutional and Socio-Cultural Components*: *Doctor of Political Science dissertation*. Tula, 2008. 389 p.; Galkina E.V. *Civil Society in in Russia's Modern Political Environment: Doctor of Political Science dissertation*. Krasnodar, 2010. 412 p.; Potseluev S.P. *Dialogue and Para-Dialogue as Forms of Discourse Interaction in Political Experience of Communication Society: Doctor of Political Science dissertation*. Rostov-on-Don, 2010, 436 p.; Kravtsov V.V. *Innovation Journalism and State in the Modern Media Environment: Doctor of Philology dissertation*. Moscow, 2014, 398 p.; Bodrunova S.S. *Mediacracy: the Media and State in Modern Democratic Communities: Doctor of Political Science dissertation*. Saint Petersburg, 2015, 426 p. .

In the mid-1980s the model of the state's domination over the society was transformed into a completely opposite model – the society's domination over the state. Moreover, a special role in this model was played by the media, which for some time turned into an independent institution of the political system. But at the beginning of the 21st century Russian media returned to the model that was characteristic of the Soviet period, however, in a bit different, not homogeneous, but heterogeneous quality.

The modern Russian media system combines features of the Soviet (hierarchical) and other models considered by researchers: communicative, libertarian, social responsibility, social partnership, etc. But due to the impact of specific features of the Russian socio-economic reforms on the media, as well as the manifestation of characteristics of different types of existence and consciousness in the Russian society (the use of ideas characteristic of the Communist ideology, Eurasianism, Western liberal values, and Orthodoxy by different social groups), the state nature of the Russian media prevailed, led to the restoration of the hierarchical model of interaction between the government, media and society[3]. Thus, the Russian media made one complete circle in its development, returning to the hierarchical model, predetermining the inevitable presence and active participation of power structures in communicative and information space of the country [22, pp. 189-190]. The need for authorities' active participation in regulating the media and the entire information and communication space is substantiated by the protection of national interests of the country.

According to L.I. Yakobson, the information space is formed by the media and the blogosphere, which unites communities of politicians, officials and journalists [23, p.135]. In this regard, it is important to consider the model of information interaction between the authorities and the media, its effectiveness and possible transformation directions in the Vologda Oblast.

Speaking about this model, it is necessary to take into account the fact that their joint performance influences formation of the society of small towns, creation of a positive information field, identification of the population, formation of the sense of small homeland and involvement in the overall civilizational process. In addition, the regional media are an effective means of implementing people's social activity within small territorial entities.

However, population's social needs are not always adequately understood by public authorities. Therefore, the need to coordinate state interests and civil society's needs becomes more acute and the problems to monitor models and mechanisms for state-media interaction require constant scientific analysis and reflection.

Scientific interest in the regional media's activities is obvious, as the local press, television, radio are not only an important link in the chain of solving the problems of single information space formation, but also have great opportunities in connection with reassessed importance of the region.

Among numerous studies of the regional press, there is a sufficient number of works devoted to the processes of authorities-media interaction [24-30]. Scientific novelty of the proposed study is associated with the identification of a special model of interaction of the government, media and society. It has similarities with the Soviet, but its vulnerability

[3] Markov E.A. *Transformations of Communication and Information Relations between the State and the Society in Russia: Doctor of Political Science dissertation abstract.* Saratov: GOU VPO SGSEU, 2011. 37 p..

is associated with incorrect construction of an addressee's image with identity of a naive subject. The novelty of the research lies in the combination of cognitive modeling methodologies and political methods to study the press.

Methodology

The Vologda Oblast regional periodicals, included in the Federal register, having the status of NGOs, and their web sites are a study object. The existing model of information interaction of the authorities, media and society in the Vologda Oblast is a subject.

In the course of the study the methods of comparative analysis are used to determine similar and specific properties of the regional media in the Vologda Oblast; the method of reconstructing a media text addressee to identify key typological characteristics of a regional newspapers reader. The method of content analysis is used to single out semantic units in texts of the regional print media, establish relationship between different text elements and the general meaning, purpose, and text information volume. Spatial, temporal and functional factors are taken into account to develop approaches to the formation of an optimal model of relations between the media and authorities.

Study data

Survey data are obtained due to the analysis of 39 regional publications, 26 of which – regional newspapers. The study includes publications for 2018 in the newspapers "Sokolskaya Pravda" ("Sokol Truth", Sokolsky District), "Sovetskaya mysl" ("Soviet thought", Velikoustyugsky District), "Sel'skaya nov'" ("Rural Novelty", Cherepovetsky District), "Zvezda" ("Star", Sheksninsky District), "Nasha zhizn'" ("Our Life", Babaevsky District). The choice of publications is determined by the principle of geographical determination and the desire to study features of the modern content of regional newspapers. Most regional newspaper offices are now NGOs and act as founders. However, regional publications are significantly influenced by the agreements on information cooperation concluded by editorial offices and district administrations. In our point of view, this factor has a significant impact on a character of publications. Most regional newspapers have a rigid content model, similar ideological and stylistic characteristics.

Most district residents, for example in Babayevsky, Sokolsky, Velikoustyugsky districts, are the audience of 45+ with a certain attitude to the information "consumption", therefore, regional newspapers remain familiar information channel for readers.

To substantiate the approach objectivity, the study uses sociological data of the Vologda Research Center of the RAS (VolRC RAS) about regional population's attitude to the media.

According to I. Dzyaloshinskii, the most effective model of media-society interaction is a model of social partnership. Its goal is to increase the "transparency" of economic, political, social, information processes, as genuine dialogue, genuine partnership, genuine trust are possible only in the atmosphere of information openness [29].

The most important indicator of the media performance is assessment of their activities by the region's population [30]. The Vologda Oblast is one of the few RF regions, where for twenty years the team of the VolRC RAS has been monitoring the economic situation and social well-being of the population. One of the monitoring areas is related to the identification of people's attitude to the media's activities. The data from these studies are published in the VolRC RAS Bulletin "Efficiency of public administration in the population's estimates" [30].

The surveys results show that in 2012–2017 the proportion of people who believe that the media provide objective information about the economic and political situation decreased from 53 to 48%, and the share of region's residents satisfied with the volume of relevant content went down from 49 to 43%. Thus, given the fact that the media are a state-society interaction channel and one of the information policy tools, we can assume that in the current model of interaction of the government, media and society, there are certain shortcomings. We should mention a biased simplified image of the information recipient in the regional media, which involves a flawed, one-sided communication model of media-society interaction.

The regional media should take into account problems and interests of their readers. Their universality is found in the desire to be useful to the most concentrated audience. The communicative model specifics is the ability to be understandable and accepted by the regional audience. Accordingly, modeling of the media-authorities interaction system should be associated with projection of the created discourse on an addressee.

The effectiveness of the transmitted information impact is determined by objectivity of the ideal image of a reader constructed by the publication, who, identifying himself/herself with the constructed subjective position, acquires his/her identity within the discourse. However, a real information recipient is usually different from the ideal, which leads to conflicting assessments of the media.

According to E.V. Chepkina, the discursive identity of an addressee is based on a special subjective position constructed in texts. The addressee identity has no constant characteristics and completion, since communication within the discourse framework has no completion [31, 32].

The position of a regional press addressee is formed by a set of factors, such as a choice of events, a way of their actualization, key concepts, ideological and evaluative coloring of subject positions. Thematic preferences of a publication, construction of a title complex, selection of vocabulary are of particular importance in this case. The main attention is paid to repetitive meanings that help reconstruct the position of an addressee prescribed by the discourse.

First of all, the local press refers to meanings of the conceptual field "regional affiliation". The analysis of scientific literature shows that the most relevant factors to identify the media audience are territorial and economic [33, p. 77; 34, p. 25; 35]. They determine the course of our research. In the article most attention is given to the ties, a recipient has with a particular area (which is associated with representatives of the local authorities), and his/her (recipient's) pragmatic interests and collective values.

Construction of the subject position of an addressee is primarily associated with the territory of his/her residence, the locus. Any indication of an addressee location unites a reader with publication subjects. Often this method is used in headings: *"Sheksninsky cathedral: miracle that happens day after day"; "Bridge named after M. Zarodov has new clothes"; "Sokol is successfully implementing the concept of active longevity"; "Fair in Erga"; "Veliky Ustyug has begun to repair yard territories"*.

Reference to the connection of texts content and, accordingly, their addressees with a certain territory also determines the national-civil identification: *"Vologda Oblast Government will help the municipalities to completely update the park of school buses"; "For the first time in our city, His Holiness Patriarch Kirill led the all-night vigil"; "Presidential Envoy to the Northwestern Federal District approved the development program of the Veliky Ustyug"*.

Territorial identification of a constructed subject is closely related to ideological characteristics, which imply an ideological community of regional authorities, editorial staff, and readers. Therefore, the use of ideological clichés becomes typical: *"Flag is a symbol of the Motherland", "Prove your name by your deeds", "With fire in the heart", "Science of doing good"*. All of them are addressed to a constructed addressee, who should take all ideologically marked constructs for the adequate description of reality.

A regional press reader is constructed by the media as a subject, presumably believing in what he/she is told to [36, p. 189]. Therefore, it is more important for the regional press to design an ideal life of society, a situation of an addressee's involvement in the community of like-minded people than to talk about his/her problems. In this case the parameters, such as age, gender, social status, income level of a reader, are of secondary importance. The constructed image of an addressee is included in the group of "friends" (in opposition to "friend-foe"): *"Know friends"; "Our bright native spot"; "And we make no secret that we belong to the village"; "Priceless cargo we carry with love"; "Vologda Oblast Government will help the municipalities to completely update the park of school buses"*. The last heading contains the identification of a "subject-reader" with an editorial office and authorities, which involves the formation of a positive image of power and the role in ensuring stability.

The hierarchy of value, news have, in the regional press is corrected by the priority of forming a positive image of regional and municipal authorities and the region: visit of the Patriarch, assessment of the President Envoy, the Vologda Oblast government will help.

Modeling of social reality is determined by founders' interests. The Vologda Oblast is a stronghold of stability on pages of the regional press. Texts of such content prevail. Since the struggle for the definition of society and its identity are constant, the constructed media picture should look as a matter of course for an addressee [37].

Region's residents are regarded as an object of authorities' concern: *"Veliky Ustyug has begun to repair yard territories"*, *"For thousand of families"; "Easement area will be cleared"; "Teachers will get compensation for the State Final Examination"; "Gas prospects"*. At the same time, newspapers attribute the identity of a passive object of political, ideological and administrative impact to a direct addressee of journalistic publications – a resident of a district or a small town. This is manifested in the presence of headings with directive modality: *"What do you have? A garbage heap? Let us see!"; "We do not sit idly by"; "Gifted children will be supported"*.

Citizens themselves are supposed to work hard, as well as support authorities' decisions: *"Growth and gain – that's not everything"; "Forty cubes daily"; "Sports ground – by ourselves"; "Right initiative"*.

Construction of the identity of a subject, a regional press reader, is closely connected with a high degree of personification of actions of a governor, regional and local governments: *"Local governments are urged to solve different tasks; if they are not solved, the municipality's life seems inconceivable"; "More than three million rubles from the regional budget are planned to be allocated for the organization of passage to land plots for large families. The Head of Cherepovetsky District Nikolai Vinogradov held a retreat on this territory"*. The activity of top officials sets the main values of social reality: information reasons and their conceptualization, choice of what events and characters deserve attention.

The analysis shows that it is important for the regional media discourse to cultivate the

Table 1. Key parameters to determine the effectiveness of regional newspapers web-sites (October 2018)

Newspaper	Updatability	Attendance from the moment of establishment	Hypertext linking methods	Dialogueness	Pragmatics of materials
"Nasha zhizn'" (Babaevsky District)	With the release of a new number	597,984	Links to the website of the administration, the Governor, the GovernmenT	Guest book is not active, login through user registration	Unilateral information on the situation in the district and region
"Sel'skaya nov'" (Cherepovetsky District)	In the same way	336,390	In the same way	In the same way	In the same way
"Sokolskaya Pravda" (Sokolsky District),	In the same way	182,204	In the same way	In the same way	In the same way
"Sovetskaya mysl" (Velikoustyugsky District)	In the same way	Not considered	In the same way	In the same way	In the same way
"Zvezda" (Sheksninsky District)	In the same way	40,669 for the last month 900 persons a day	In the same way	GB is active, login through nickname, updated regularly	Content generation is subject to reader request

idea "the region maintains stability and unity in support of the federal and regional authorities". According to N. Luman, this kind of messages that do not have any new information perform an important ritual function. Excessive, meaningless communication "can be used to confirm social cohesion: people tell each other the same thing to witness solidarity" [36, p.22].

Criticism in regional editions, if present, concerns small shortcomings in the zone of municipalities' responsibility: "*One of managing companies in Sheksna extorts means for repair of balconies from flats owners"* (newspaper "Zvezda", No. 68 (11618), the material is located on the fourth page within TV programs).

The exclusion of inconvenient news items from newspaper publications significantly narrows their subject matter and creates the illusion of a lack of alternative points of view on what is happening. We believe that the real reader of the regional press is heterogeneous, well acquainted with region's problems, ready to take part in their solution, so artificial avoidance of contradictions in the local press largely reduces the effectiveness of interaction between the media and society.

Given the heterogeneity of the modern media, the ability to change content when changing the way of information presentation, we consider websites and social network groups of the analyzed regional newspapers "Nasha zhizn'" (Babaevsky District), "Sel'skaya nov'" (Cherepovetsky District), "Sokolskaya Pravda" (Sokolsky District), "Sovetskaya mysl" ("Velikoustyugsky District), "Zvezda" (Sheksninsky District) in terms of the view indicated in the criteria analysis.

The following parameters are chosen: attendance, content structure (subject), information updatability, hypertext linking methods, dialogueness (forums, guest books, need for registration, etc.), quality of information and pragmatics of materials, information about founders.

The tables demonstrate that websites of most regional publications are informational. Most often they duplicate materials presented in the printed edition. At the same time, the content structure, the main sections and the hierarchy of news messages are completely repeated: politics, information on the achievements of the district's residents, announcements. Communities in social

networks VK, Twitter and Instagram also duplicate the information contained in the newspaper. There is no active discussion. The main page of websites contains a link to the website of the Governor and local authorities. The degree of website dialogization is minimal and is mainly represented by private ads and advertising.

However, a special role in the Internet space of publications under review belongs to the newspaper website "Zvezda". Its informational structure is determined by the needs of its readership. The news hierarchy depends on the relevance of events taking place in the area. The website contains public information about the number of visitors; it is simple and convenient in terms of building a dialogue with the reader. This is the only one of reviewed online publications where a guest does not have to register. This largely determines the degree of its availability and popularity among the readers. Of course, the main reader's request is related to the solution of their own pragmatic problems. But the advantage of the publication is not only their participation in problem decision as a mediator. Work with the reader in the Internet space helps them navigate in the society and make proper decisions.

It is no coincidence that according to the ranking of media resources of the Vologda Oblast for 2017 conducted by Medialogia company, the newspaper "Zvezda" in Sheksninsky District ranks fifth (16.33) in the category of TOP–10 most cited media of the Vologda Oblast[4].

Conclusion

Permanent dialogue between the authorities and the society is of utmost importance for the modern state: it is a system-forming and regulating factor in the socio-political environment. However, the one-sided model for its implementation, substituted by a monologic form of communication that only simulates dialogism, indicates the pseudo-naturalness of the national civil identification of the addressee of regional periodicals [37, p. 123]. The image of a naive addressee modeled by regional publications is presented as an economically prosperous subject grateful to the local authorities for this.

In our view, the idea of the recipient of information as an addressee with an identity of a naive subject is incorrect as it lowers the reader's interest in published materials and has a negative impact on the efficiency of the interaction model of the government, the media and the society.

The model does not correlate with the concept of "quality press", which ideally should encourage the reader to think together, develop their own attitude to essential social processes.

We believe that the only possible model of successful interaction between the government, the media and the society is a partnership model in open public policy. Its creation is only possible if we refuse the image of a naive reader built by regional publications. The most important method is the introduction of dialogue models of information and communication interaction in the state-media-society system and the focus on emotional style and relevant content. The content of the current media agenda should determine the mutual interest of civil society and public authorities. Only then the harmonization of social-state relations becomes the determining factor in sustainable and stable development in modern Russia. The idea of civil society is a mechanism of constant change and improvement, transition to a more civilized state. If its influence becomes obvious, then the concepts it generates are constantly present in the communicative social environment where the government only implements its functions.

[4] *Medialogy*. Available at: http://www.mlg.ru/ratings/media/regional/5760/ (accessed November 27, 2018)

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Motivating Young People's Labor Behavior as an Opportunity for Implementing Financial Strategies

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Abstract. The constantly changing socio-economic conditions in Russia attract the researchers' attention to the urgent problem of unemployment, in particular among young people. The article, based on the results of the study (conducted in Moscow in 2017) obtained using sociological methods – qualitative

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(expert interviews) and quantitative (questionnaires), discusses various barriers to the implementation of the labor potential of young professionals (aged 23–35) in the labor market in Moscow; special attention is paid to factors that influence labor motivation. The age group under review has an absolutely objective attitude towards vulnerable population groups in the labor market. The purpose of the present research is to identify the dominant factors limiting the use of labor potential of young people, and analyze the current trends in the labor market which help critically assess the prospects for realizing their abilities in labor activity for further development of financial practices. The study shows that this is primarily due to lower competitiveness of young people compared to their more experienced colleagues, as well as emotional immaturity when addressing financial issues associated with loss of job or with longer periods of search for suitable employment. It is revealed that young professionals are often biased wen assessing the trends in supply and demand in different markets, including wages for a particular profession; their wage demands are unreasonably high. The population group under review tends to idealize their skills and knowledge, which does not lead to successful employment. The ability and willingness of a potential employee to retrain (independently or with the help of employment services) directly affects effective search for employment, income generation and, accordingly, development of a certain financial strategy. Labor behavior (motives, actions and results) of young people is the basis for implementing active economic behavior. The research results are presented as recommendations to the Department of Labor and Social Security of the Moscow Government and are practically implemented in activities for population's social security in Moscow.

Key words: the youth, labor behavior, labor market, employment, salary level, financial strategy.

Introduction

People's economic behavior (including certain motives and actions) in the sphere of income generation as a result of labor activity and expenses in the form of consumption, savings and investment is studied by foreign and Russian researchers – economists, sociologists, psychologists [1; 2; 3]. The primary factor forming strategies of economic behavior is income. The main source of income of the Russian population (at least for more than two thirds) is wages. Consequently, the ability and motivation for labor is the framework for income, which, in turn, helps a person build a financial strategy for their expenses.

Work is the process of implementing people's abilities. According to Karl Marx [4], the results are determined by the costs of human brain, nerves, muscles, sense organs, etc. Abilities (mental and physical) are also inextricably linked to the people's labor realization; this applies especially to the younger generation. It is for a reason that researchers most generally define an ability as a set of people's physical and mental qualities aimed at creating certain socially useful results. These abilities only vary in personal capabilities and talents.

Abilities are determined by the institutional environment that creates conditions for individuals' labor implementation, as well as socio-economic factors that determine the effective use of people's abilities at various stages of social development.

Motivation for work is defined as an individual's desire to meet their needs through work, where one of the basic principles is the understanding of the nature and importance of motivation in the work process[1]. Finding

[1] *The Great Encyclopedia of Economics*. Moscow: Eksmo, 2007. P. 391.

fulfilment at work is especially important when a person is at the very beginning of their career; this encourages the achievement of results, gives confidence not only in their own abilities now but also in the future. It is at this time that we form first professional skills, understand the value of the chosen profession, choose the vector of career development, and realize the opportunities for implementing financial strategies to improve own and social welfare. Confidence in the future which can be felt through the application of active financial strategies, is not only an element of setting people's social or psychological state, but also a reasoned position to stabilize the economic situation associated with the standard of living and the quality of life.

The relevance of the research into the youth labor market lies in a fairly high share of young people among the working-age population of Russia, namely about 35%, as well as the strategic role of young people in the country's economic development.

The current situation in the labor market constantly imposes new requirements for the development of labor relations. Nevertheless, efficient mechanisms for the use of labor resources have not yet been identified, and the problems of employment and rising unemployment, including among young people, have not been resolved. Unfortunately, unequal access to educational services, hence to the opportunities for further self-realization at work, is increasing. In this regard, one of the state's regulatory objectives should be maintaining balance between economic and employment priorities in the programs of economic transformation [5, pp. 5–6].

In light of this, the purpose of the present research is to identify the dominant factors limiting the use of young people's labor potential, as well as to analyze current trends in the labor market that help critically assess the prospects for implementing their abilities in the course process of employment for further formation of financial practices.

To achieve the goal, the following objective are set and solved:

– to assess the opportunities and barriers for the implementation of young people's labor potential in the Moscow labor market;

– to identify the factors influencing the labor motivation among young people;

– based on analysis, to identify the features of formation of financial practices among young people as a unique age group with its own life-style strategy.

Problem development

A significant number of studies of Russian researchers devoted to the characteristics of the youth labor market and factors influencing the formation of behavior strategies of young professionals.

One pf the most important problems is lack of appropriate links between the labor market and its human resources. On the one hand, studies have found that many students in 9–11 grades either cannot explain the reasons for choosing their future profession, or doubt whether their choice is correct [6]. On the other hand, employers are often not ready to employ young people without work experience [7]. The situation of young professionals is obviously disadvantageous compared to other age groups due to lack of work experience. The owner of any company will prefer a more experienced and qualified employee than one who has just graduated from a university [6]. The situation is also complicated by the fact that, according to surveys, it is unknown how many and what specialists are required, for example, next year in specific economic sectors so it is impossible to provide workplaces for each of the graduates [7].

The problem of contradictions between employers' requirements and young professionals, identified the representatives of the Russian Public Opinion Research Center (VTsIOM) lies in the fact that young people often have high wage expectations. First, this is due to the spread of online rankings of professions and their remuneration level. Second, a modern worldview where young people's needs are prior to accumulated knowledge and experience also plays an important role. In turn, employers are not willing to pay a lot of money to employees who require extra investment[2].

The researchers form the Centre for Youth Studies of the Higher School of Economics (TsMI NIU VShE) have identified the expectations of young people in terms of employment: it should be interesting/not boring, well paid, meaningful and at the same time it should give a certain degree of freedom. The researchers emphasize that young employees learn to defend their rights early, and if they are not satisfied with something at work they quit. It is confirmed by the results that by the age of 30 young people repeatedly change their employment and their profile[3]. As for the profile, employment in public sector is chosen by young people who are more or less motivated to work by their profession. Self-employed people who often work in large and medium business do not attach much importance to education compared to public sector employees. There are special job search channels depending on the sphere of employment: state employees and those working in private companies are often guided by acquaintances, relatives and official channels when searching for job; freelancers most often use the opportunities of casual acquaintances.

The appeal of job search channels such as "acquaintances" and "specialized web sites" is also noted by the experts of the NAFI Research Center (58% and 44%, respectively)[4].

Apart from the issues of job search among young people, the researchers re also interested in the problems of the impact of unemployment on the social situation of this population group [8], in particular, in young professionals' ability to build a certain behavior strategy in the financial sphere based on their income [9]. This primarily refers to consumer, saving and credit behavior of young people.

After the crisis, which began in 2008, the problem of unemployment also affected Europe, relatively prosperous up to that time. Foreign and Russian researchers cover similar issues: for example, what measures the government take to help young people with retraining courses for further employment [10].

The aggravated situation of youth unemployment forces many countries to seek new ways and mechanisms. A number of foreign countries have already developed strategies and launched programs to increase employment opportunities for young people [11; 12; 13].

The negative aspect of modern unemployment is social isolation (in education and employment) among young people left without (did not find their first job) the desired workplace [14]. This is no longer a question of the inability to form a model of economic behavior due to lack of income; it is a threat associated with the criminalization of the society.

European researchers propose new methodological approaches to statistical measurement of youth unemployment in

[2] VTsIOM public opinion poll 2016. Available at: https://wciom.ru/index.php?id=236&uid=249

[3] Project "Youth solidarity and generations of the 21st century: the value of labor and consumption" carried out by TsMI NIU VShE in Saint Petersburg (supervisor – E. Omel'chenko).

[4] Official website of the NAFI Research Center. Available at: https://nafi.ru/analytics/rossiyane-ishchut-rabotu-cherez-znakomykh/

addition to the traditional indicators (employment and unemployment) which do not fully reflect the situation of the studied population group in the labor market. In recent years, the approach based on the concept of NEET-youth has become widespread in the EU and OECD countries[5]. Based on Eurostat data, the main socio-demographic characteristics of NEET youth and the performance of NEET level in the EU countries in 2000–2013 are analyzed. A strong correlation between the levels of NEET calculated for different age and gender groups of young people was revealed. This indicates the existence of general institutional and structural conditions at the macro level that either stimulate or limit the incorporation of young people into employment and education [15].

Information and methodological research framework

The researchers of Institute of Socio-Economic Studies of Population of the Russian Academy of Sciences (ISESP RAS) in 2017 completed a project aimed at identifying the characteristics of the labor market of a capital city and its impact on the employment of Moscow residents from vulnerable population groups in terms of employment [5]. The research was carried out both on the basis of own sociological measurements and the analysis of secondary data received by other Russian and foreign researchers.

There is a separately distinguished category of young people aged 23–35 –a category that already has a certain level of education but (mostly) does not have work experience by trade.

In order to obtain practical results of the study, a sociological quantitative method was used –information was collected through questioning the unemployed who applied to the Moscow Employment Service (ES), and using a qualitative method (expert survey of employees of the Moscow Employment Service).

The first method requires the development of a questionnaire containing 41 questions and consisting of four blocks. The survey of respondents was carried out in nine administrative districts of Moscow, as well as in the state public institution "Youth Employment Center of Moscow". We calculated sample quotas for the number of unemployed in each district. The category of young people was represented by 228 questionnaires (15%).

The second – quality method – is an expert survey based on the interview scenario for the survey of expert employees (from 9 employment departments of the ES of Moscow – one expert from each department) of the Moscow employment service providing assistance in employment.

Results

The beginning of each century poses a qualitatively new challenge for humanity associated with the expectation of a significant improvement in people's living conditions. In this case, the younger generation in our country, as well as in other countries, is the subject of attention of the society and the state as they are a strategic resource in economic development and well-being of the society as a whole.

The Strategy of youth development of the Russian Federation up to 2025[6] emphasizes the need to "continue working on educating competent, responsible, morally and physically healthy young citizens". The program is focused on revealing the intellectual and labor potential of the youth in Russia.

[5] NEET-youth – Not in Employment, Education or Training youth.

[6] *Strategy of youth development of the Russian Federation up to 2025.* Available at: file:///C:/Users/%D0%9A%D1%80%D0%B8%D1%81%D1%82%D0%B8%D0%BD%D0%B0/Downloads/98aeadb5-7771-4e5b-a8ee-6e732c5d5e84.pdf

However, the situation of this population group in the modern Russian society is extremely ambiguous. On the one hand, this is the most active part of the society that quickly improves in professional and career aspects. This category is characterized by increased independence, practicality, responsibility, i.e. it is able to think and create independently. On the other hand, the difficulties of the transition period have had a rather significant impact on young people. Only a small part of them managed to find their place in the market system. The majority of them are not yet able to adapt to the changed situation. Their social status declines, their opportunities for education and cultural values are reduced, while crime and deviant behavior increase, along with unemployment [16].

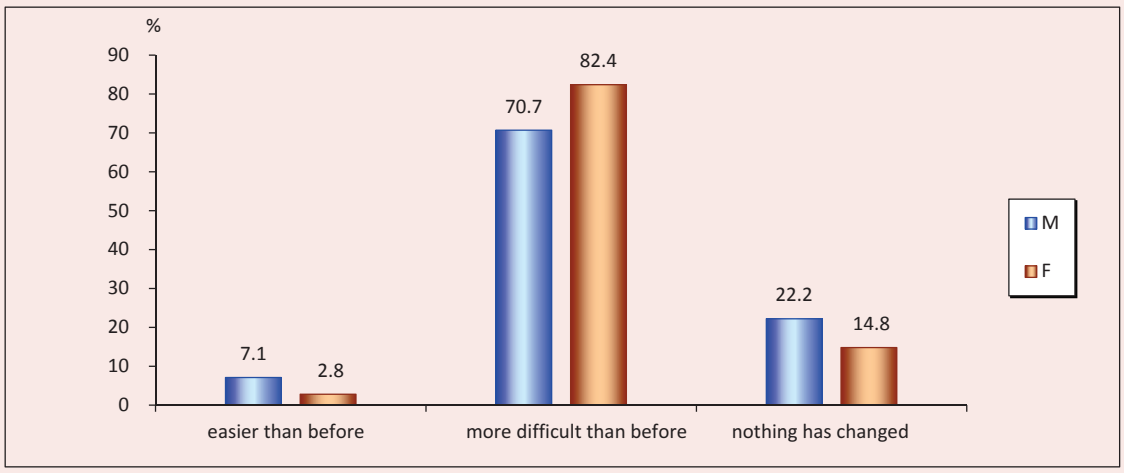
The implementation of the labor potential of young people is accompanied by a number of features, in particular, the difficulty of finding a job. The vulnerability of young people is largely due to their lower competitiveness compared to those with professional experience; young people are not always able to find a job according to their needs so they are forced to fill vacancies that do not meet their own expectations and opportunities, which can lead to the development of counterproductive forms of labor behavior.

According to the results, young people are fairly pessimistic about the state of the labor market and are pessimistic as regards their chances of finding a suitable job [5, p. 120].

Compared to previous years, it has become more difficult for the majority of respondents aged 23–35 to find employment in Moscow (in particular, 82.4% of women and 70.7% of men), which cannot but affect the labor activity of citizens (*Fig. 1*). Gender differences in responses are related to the characteristics of the labor market, which determine the range of professions and vacancies.

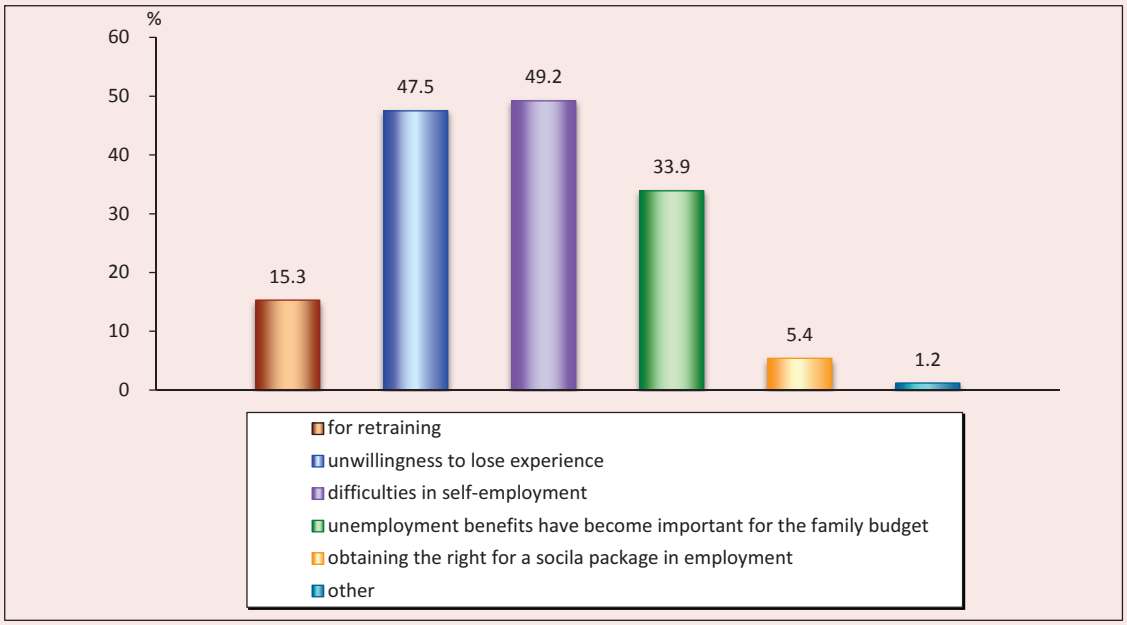
Assistance in finding employment for this category of citizens is carried out by the State Employment Service. Since contacting the Service is voluntary, the assistance depends on the motivation of unemployed young people

Figure 1. Distribution of respondents' (aged 23–35) answers to the question "Has it became more difficult to find a job in Moscow?», %



Source: compiled by the authors based on results of the research project "Problems of employment of vulnerable population groups in Moscow", 2017.

Figure 2. Distribution of respondents' (aged 23-35) answers to the question "Why did you appeal to the City Employment Service?", %*



* The total is not 100% as the question implied several answers.

Source: compiled by the authors based on results of a research project "Problems of employment of vulnerable population groups in Moscow", 2017.

to work and their willingness to benefit from state assistance. With regard to the latter, young people only appeal to the ES when more priority employment channels – specialized websites – do not bring positive results.

The researchers of ISESP RAS highlight the following most important aspects of formation of internal motivation to work: 1) the reasons for applying to the ES; 2) willingness to work not only by trade; 3) willingness to retrain for successful employment.

According to the survey, half of the respondents (49.2%) applied to the ES because of difficulties in self-employment – (*Fig. 2*).

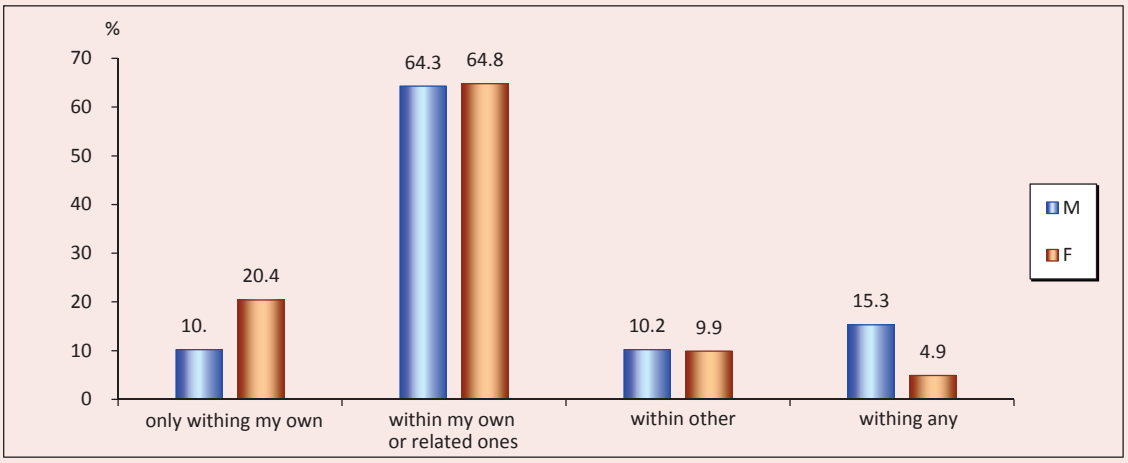
47.5% do not want to lose experience, almost 34% of young respondents sought unemployment benefits, 5.4% – a social package, 15.3% – to retrain, and 1.2% indicated other reasons.

With regard to gender differences, young women are more motivated in terms of employment and retraining opportunities, which also confirms the problem of labor market opportunities and employers' attitudes towards women in a number of professions.

According to the representatives of the Youth Employment Center (YEC), it is not so difficult to find a job for young people as the state policy, especially of the Moscow government, is aimed at staff rejuvenation. However, if we analyze the "youngest" group (aged 23), the number of employers willing to take graduates (usually without experience) is very low.

The analysis of the second aspect of motivation to work – the willingness to work outside one's specialism – shows the following gender differences in the responses of unemployed young people in Moscow (*Fig. 3*).

Figure 3. Distribution of young people's answers of to the question "Within what trades are ready to work?", %



Source: compiled by the authors based on results of the research project "Problems of employment of vulnerable population groups in Moscow", 2017.

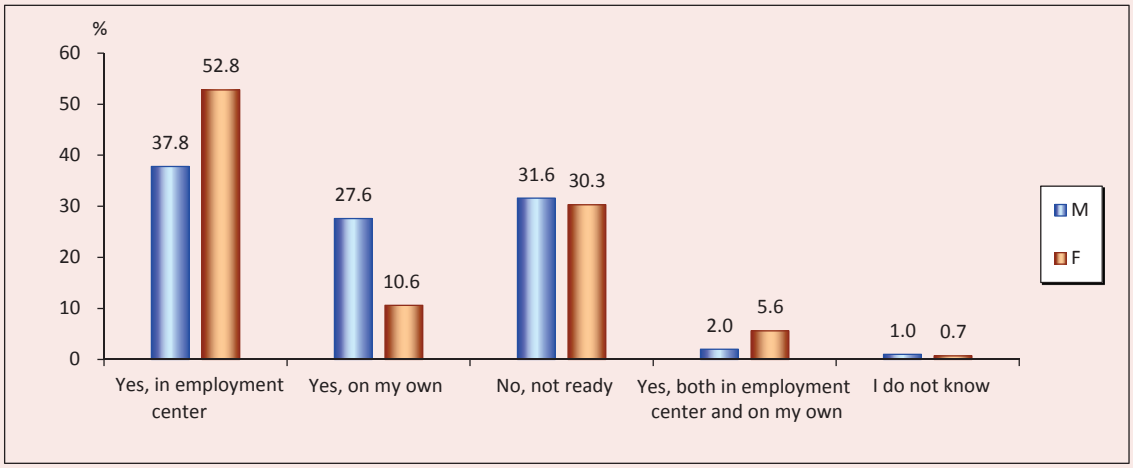
The majority of young people, regardless of gender, are ready to work within their own and related trades – more than 64% of respondents.

10.2% of young men and 9.9% of young women are ready to work withing another trade, which is due to the fact that the majority are qualified in a specific profession and attempt to find their "place in the sun" in the chosen or related trade. Nevertheless, 15.3% of young men and 4.9% of women agree to any job, which indicates the responsibility of men not only for themselves, but also for their family (presumed family), since in most families men are breadwinners (especially at this age, where many young men start a family and wives are on maternity leave); young women are characterized by stability and consistency in their decisions, if they change their profession, it will require retraining, as evidenced by the data below.

As for the third motivation aspect – the willingness to retrain for possible employment – more than half of young people (more than 60% of both men and women) agree to it. In particular, 52.8% of women prefer to retrain at employment centers, whereas only 10.6% of women want to retrain by themselves (*Fig. 4*). The situation is somewhat different among men: 27.6% are ready for self-retraining compared to women, while only 37.8% are ready for retraining in the employment center. Almost one third of respondents, both women and men, are not ready to learn a new trade.

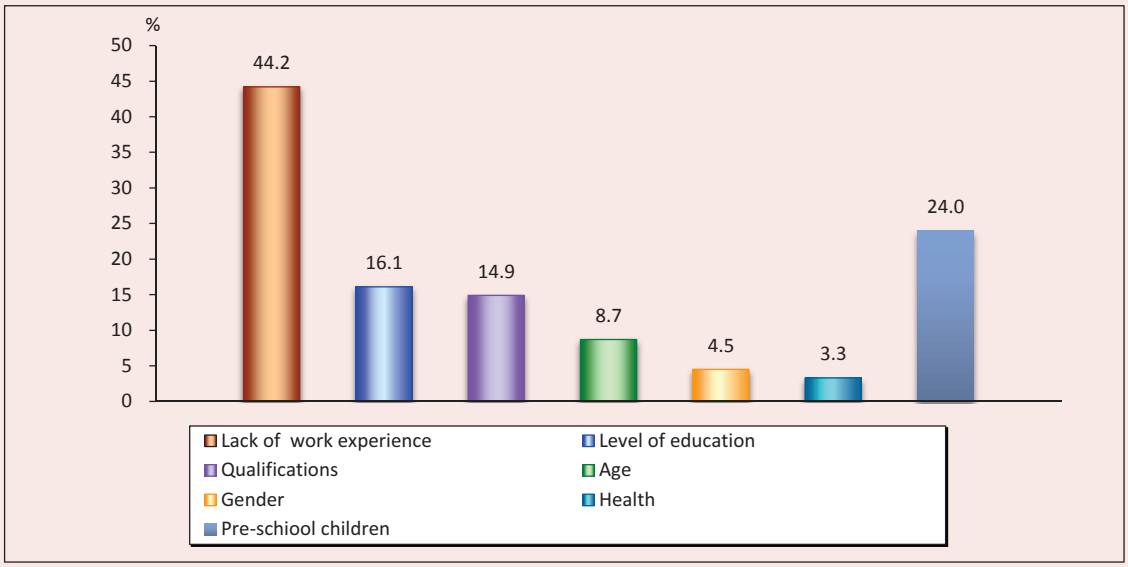
The majority of young people (44.2%) note lack of work experience as the main reason hampering the maximization of their potential (*Fig. 5*). It is noteworthy that the level of education (16.1%) and qualifications (14.9%) also play a significant role, which is due to the respondents' age – this was noted by the respondents themselves (8.7% note age as a factor hindering their employment). 24% of young people note that pre-school children limit the employment which is also due to the age limit; the majority of young people at the age under consideration start families and have children, which is a barrier to employment, especially for women. Therefore it might be more difficult to retrain for this reason.

Figure 4. Distribution of respondents' (aged 23–35) answers to the question about their readiness for retraining for employment, %



Source: compiled by the authors based on results of the research project "Problems of employment of vulnerable population groups in Moscow", 2017.

Figure 5. Distribution of respondents' (aged 23–35) answers to the question "In your opinion, what hinders your employment?", %*

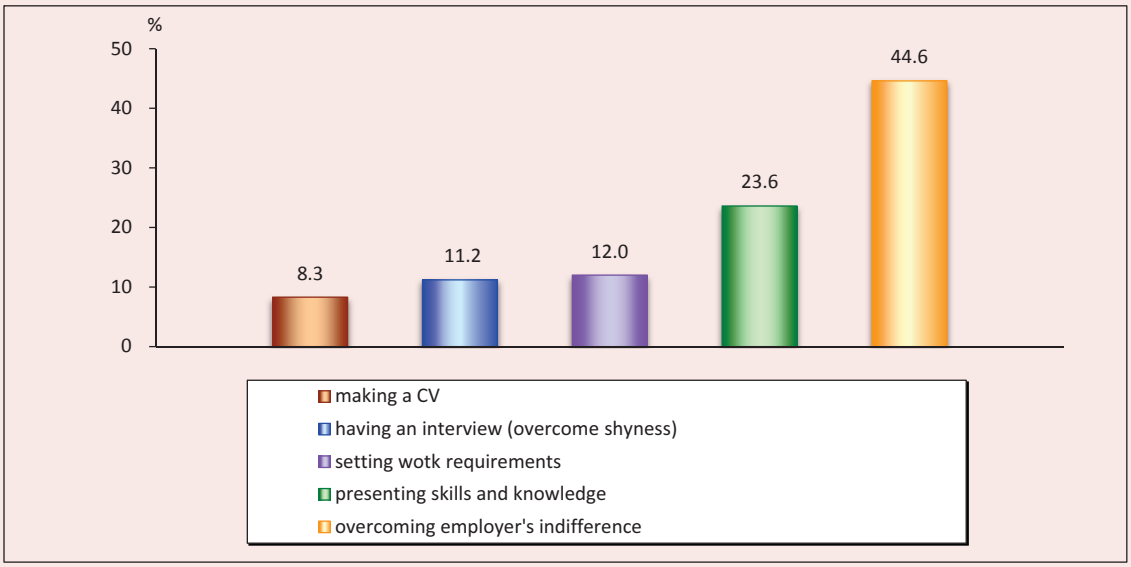


* The total is not 100% as the question implied several answers.

Source: compiled by the authors based on results of the research project "Problems of employment of vulnerable population groups in Moscow", 2017.

Regardless of age and gender, respondents have difficulties with employers' indifferent attitude. 44.6% of respondents face such a situation. The ability to show their skills and knowledge is a difficulty for 23.6% of young people; to be confident at an interview, overcome shyness in a conversation – 11.2% of young respondents (*Fig. 6*).

Figure 6. Problems arising from dealing with potential employers among young people (aged 23–35), %



Source: compiled by the authors based on results of the research project "Problems of employment of vulnerable population groups in Moscow", 2017.

Distribution of respondents' (aged 23–35) answers to the question related to decent wages, %

Sex	Wage ranges, RUB						
	15001–20000	2000–30000	3000–40000	4000–50000	5000–60000	6000–70000	7000–100000
Females	0.7	17.9	29.3	26.4	9.3	5.7	10.7
Males	2.0	19.5	22.7	17.6	11.3	4.1	26.7

Source: compiled by the authors based on results of the research project "Problems of employment of vulnerable population groups in Moscow", 2017.

Making a resume is difficult for young people (8.3%), as well as setting their work requirements (12%), which is not surprising since life experience plays an important role in shaping ideas about future work.

As for salary claims, the respondents' answers are as follows (*Table*).

According to more than a quarter of young men (26.7%) decent wages range within 70,000–100,000 RUB, for women (29.3%) – from 30,000 to 40,000 RUB.

A slightly lower share of men (22.7%) set decent wages within the range 30,000–40,000 RUB, while 26.4% of women mark the range from 40,000 to 50,000 RUB. This fact is caused by the respondent's occupation, experience and qualifications, as well as age. It is obvious that wage requirements at the age of 23 and 35 also differ significantly.

According to experts of the ES of Moscow, young people often have unreasonably high wage requirements:

"Young people are tough, they claim at least 50 thousand at once. We can offer a lower paid job – an average of 25–30 thousand. It is very real for beginners but many of them do not understand this".

However, the reality rather quickly reduces the ambitions [5, p. 142]:

"We had a lot of young programmers last autumn – all received low wages; apparently, they realized that they needed to gain experience as fast a s possible".

"A year ago, when there was a wave of downsizing among government officials, young people came to the ES with a salary of 200–300 thousand rubles – heads of departments and offices, who at first wanted related positions. But, having got acquainted with the situation on the labor market they realized that there was not enough space for everyone and began to seek employment as chief and leading experts. Everyone is happy".

The survey of experts revealed that there are no special internship programs for those who do not have work experience, but sometimes employers can apply to the Moscow departments of the ES with proposals for training.

"We have special employment programs, for example, for students during training – this is temporary employment. We have no internship yet, I think it would be better if educational institutions did that and after than trained them. That is why students graduate with little or no experience. It used to be different: all students had an internship program, as a rule, if they studied they already knew where they would go to work".

"Employers themselves apply to us; they offer training and retraining programs for a certain profession, of course, there are not so many of them. Then young people are employed on a probation period. We recently dealt with an employer who offered a position of an operator at a call-center. Such employees are often needed, people are recruited for such positions".

"The employer creates jobs, it is not like an internship, but this program is somewhat similar to internship. This is a temporary work for a month, for two, in different fields. For example, graduates are offered jobs like manager, engineer, specialist; there are special programs, but they are very rare nowadays. The employment service pays extra to such graduates if they earn a total of less than 17,600 RUB, i.e. it is a kind of an incentive for the employer because the employer can pay less than this amount. However, for some reason, very few such jobs have been created recently. The main directions of the program are: professionals, managers, engineers, but there are less engineers in state and commercial organizations" [5, pp. 142–143].

Thus, the situation of modern youth in the labor market can be described as follows:

– they are ready to change the type of professional activity;

– a certain part of young people are limited in professional development and employment by trade for;

– there is imbalance between acquired education and the needs of the modern labor market, which increases unemployment among the younger generation;

– uneven distribution of young professionals in the field of material and spiritual production, as well as in the public and private sectors of the economy;

– lack of interaction between education and labor institutions, which entails a structural professional imbalance of supply and demand in the youth labor market;

– a vulnerable position of rural young people in the labor market, inferior in many aspects to the level of competitiveness of urban young people, which contributes to the growing territorial stratification in the youth environment;

– a high degree of uncertainty, instability in labor relations, which forms a negative background in the assessment of young people's

future prospects in terms of professional development and active financial behavior, the use of various strategies in effective income distribution.

Changes in economic relations that occurred as a result of the transformation of the Russian society have created the need to develop the skills of forming effective financial strategies. And first of all it concerns young people.

Financial behavior depends on the diversity of objective and subjective multi-level and diverse factors that affect appropriate decision-making [17]. These are: income level, experience of savings and investment activities, financial literacy, population's degree of awareness of the possibilities of financial investment, development of financial institutions, reliability and information availability of financial products, as well as trust in financial institutions and the level of financial culture in general. Unfortunately, the influence of many factors on the strategies of financial behavior in Russia is negative. Only a small part of the Russian population can demonstrate a high level of income, financial literacy and culture with positive savings and investment experience and confidence in the financial sector.

The formation of young people's financial culture is the starting point on the way to increase their own well-being by constant search for maximizing their labor potential. Financial knowledge is necessary for everyone, regardless of age and professional experience. But this is especially important for young people who are just starting their independent life and professional activity.

Young people act as a strategic resource in economic development, a promising segment of users of financial services in our country. Investment in improving their literacy will have the greatest impact in the future: first, young people are more receptive to learning programs. At a young age, people constantly learn something – at school, college, institute, various courses. Mastering the basics of financial literacy can be included in educational programs as another competence that young people will receive in the process of their education [18; 19].

Second, within the framework of educational institutions it is possible to achieve maximum coverage of various population groups as children from all social groups study in schools and universities.

Finally, financial education for young people will have the most lasting effect – they are only at the beginning of their career and financial path.

Unlike young people, people of mature age already have certain attitudes in financial behavior [20] and are less inclined to change their attitude to activities in the financial market, while young people, on the contrary, have a trend to accept new information, a long period for knowledge application, and increased risks.

The population group under review strongly express the desire for innovation due to their psychological and social characteristics, so they can potentially make more choices in favor of new financial instrument that have just appeared on the market. This is particularly relevant in connection with the beginning of the digitalization process.

The younger generation will have to live in a society where the degree of state participation in the economy and the degree of protection from the consequences of negative financial decisions is not clear. Therefore, they needs to be aware of their own responsibilities for decisions in labor development, choice of career and life-long education, finding different ways

to increase income, whether employment or running own business (and, as a consequence, personal finance management), they must accept them based on a competent analysis of financial market factors.

Lack of knowledge and understanding of basic foundations of finance affects the development of business as people sometimes do not know where to start a business and how much money is required. There is a statement by John Bryant, Vice-President of the Financial Literacy Council under US President, which reflect all the importance of financial literacy for an individual and the society in general: "Financial culture in today's developed and rapidly changing world has become another vital element in the system of skills and rules of conduct. Financial literacy will make sure that people do not to depend on circumstances, on other people's will, on the system. An educated person chooses paths in life that are most attractive, creating a material framework for further development of the society".

Low labor activity and, as a consequence, low incomes are an obstacle to the ability to freely choose own financial strategy for the younger generation.

Developing the skills of competent management of personal finances should contribute to the education of a new generation of citizens actively involved in the process of making and discussing budget, financial and investment decisions, labor activity, which will ensure a high level of their own well-being, as well as progressive development of the financial market and increased competitiveness of the domestic economy.

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Decoupling in Environmental and Economic Development of Regions-Participants of Cross-Border Cooperation*

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Abstract. Moving towards "green" economy is currently a priority direction for the development of many countries, including Russia. One of the key aspects of the concept of green economy is achieving decoupling or misalignment of economic growth rates, resource consumption and negative environmental impact. The purpose of the article is to analyze the decoupling of negative environmental impact and resource consumption in economic activity in border regions of the Russian East and the entities of the Baikal region with cross-border economic relations with China. The research novelty lies in identifying the possible impact of cross-border position on environmental and economic development of the areas under review. Long-term experience of cooperation with the neighboring state demonstrates that prospects are followed by environmental problems since the economy of Siberian and Far Eastern regions is consistently focused on raw materials. The decoupling coefficient is calculated to identify the misalignment between economic growth rates and environmental pollution. The use of natural values as an economic result in calculations distinguishes this study from similar works focusing mainly on analyazing cost indicators. The results of eco-economic analysis show that in regions of cross-border cooperation, decoupling is manifested in discharge of contaminated wastewater. Decoupling was also revealed in most cases due to the negative impact on the atmosphere. However, economic development in some regions is accompanied

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by increasing air pollution, which is most evident when considering the situation in terms of most common pollutants and main economic activities. It has been established that rapid development of cross-border relations with China does not significantly change the situation in the Eastern regions. Further research prospects are related to detailed study of the aspects of eco-economic development of basic industries in Russia and the regions of cross-border cooperation.

Key words: economic development, negative environmental impact, natural resources, environmental capacity, decoupling, regions of cross-border cooperation.

Introduction

Currently, the need and possible ways to shift towards "green" economy, which is aimed at improving people's welfare and quality of life, as well as reducing risks to the environment and its degradation [1, p. 1], is widely discussed in works of Russian and foreign researchers [2–8, etc.]. One of the key aspects of the concept of "green" economy is achieving the effect of decoupling, which is the misalignment of economic growth rates, on the one hand, and resource consumption and negative environmental impact, on the other hand [9, p. 62]. There are two types of decoupling: resource decoupling and impact decoupling [10, p. 4]. Resource decoupling involves reducing the consumption of primary resources (energy, water, minerals, etc.) per unit of economic result. In this case, we are talking about the "dematerialization" of economy and improving efficient use of resources in production of economic benefits. Impact decoupling implies an increase in production volume while reducing the environmental burden (pollutant emissions into the atmosphere, wastewater discharge, waste generation, etc.).

A large number of research works are devoted to studying the decoupling effect. Some of them focus on analyzing the relations between economic growth and degree of environmental pollution at the national level [11, 12]. The works by Russian authors pay much attention to the study of trends in economic development, resource consumption and environmental pollution at the level of federal districts [3], regions, and separate industries [13–16].

The purpose of the article is to analyze the effects of decoupling of the negative environmental impact and resource consumption in economic activity of border regions of the Russian East and the entities of the Baikal region with cross-border economic relations with China. For many of them, the problem of the impact of economic development on the environment and public health is particularly relevant since the total environmental load in these areas (for example, per capita or unit of economic result) significantly exceeds the average Russian level [17]. The current form of cross-border relations with the neighboring state, within the framework of which projects are implemented in Eastern regions mainly in mineral extraction and processing, together with the prospects poses certain threats [18]. The proximity to China and its interest in importing fuel and energy, mineral and forest resources for own production ensure the focus of economies of most Eastern regions-participants in cross-border cooperation on resources. The predominant development of the primary sector of the economy, characterized by a low degree of mineral processing does not ensure an increase in population's welfare corresponding to economic growth. Moreover,

there are cases when Chinese companies do not fulfill the terms of license agreements. For example, *LuNeng* Mining Group[1] engaged in iron ore extraction at the Berezovsky Deposit in Zabaykalsky Krai have repeatedly pushed the deadline for constructing a mining processing plant. Currently, open-cast ore is exported to China, while Russian citizens hired for this purpose receive monetary remuneration in the territory of the neighboring state. Thus, China has greater benefit from this cooperation while the positive effects from implementing joint projects for the border territory of Russia are not so obvious.

Research methods and sources of information

Decoupling can be interpreted in terms of indicators of environmental capacity [9]. They reflect the degree of natural resource consumption (for example, energy intensity, water capacity, etc.) and pollution (eco-intensity) per unit of economic output, which is most often used as the main measure of level of economic development – GDP (at the regional level – GRP). The concept of impact decoupling is directly related to eco-intensity, which is studied in a large number of works by Russian and foreign researchers [19–21, etc.]. In order to identify the misalignment between economic growth rates and environmental pollution, the decoupling coefficient is used, which is calculated according to Formula (1) [12]:

$$D_t = 1 - \frac{E_t / Y_t}{E_0 / Y_0}, \quad (1)$$

where E_0 and E_t – indicators characterizing the negative environmental impact in the reference and current period; Y_0 and Y_t – indicators characterizing the economic result in the reference and current periods, respectively.

The D_t coefficient shows the change in eco-intensity (E / Y) relative to the beginning of the study period. Its negative value indicates the absence of decoupling. The positive value of D_t indicates contrasting trends in economic development and anthropogenic impact: the increase in value added is accompanied by a decrease in environmental load on the environment. It is noteworthy that this condition is weaker than the criterion used in the model of P. Victor [6] for assessing the performance of eco-economic development from the perspective of the concept of "green" growth. However, the decoupling rates of economic development and environmental pollution indicate to shift towards "green" economy [18, 22].

The resource management efficiency in the process of creating economic benefits can be assessed through one of private indicators of environmental intensity – energy intensity, i.e. energy costs per unit of final product [23]. The indicator is calculated according to Formula (2):

$$E_i = \frac{V}{Q}, \quad (2)$$

where V – energy resources consumed in production process; Q – output (can be expressed both in natural and in cost form).

The present paper uses the following official data of the Federal State Statistics Service, Territorial unit of the Federal State Statistics Service in Zabaikalsky Krai, PAO Territorial'naya generiruyushchaya kompaniya no. 14 (PAO TGK-14), AO Inter RAO –

[1] Head of the Nerchinsko-Zavodskoy district demands that "Luneng" is revoked of the license. Available at: https://www.chita.ru/news/89339/ (accessed: 01.10.2018); Chinese company which refused to construct a mineral processing plant keeps its iron mining license. Available at: https://www.chita.ru/news/110850/ (accessed: 01.10.2018).

Elektrogeneratsiya, branch of AO SO UES Trans-Baikal regional dispatching department (RDD) (values are reduced to comparable form):

– Gross Regional Product (GRP);

– contribution of main economic activities (MEA) to GRP;

– pollutant emissions from stationary sources;

– polluted wastewater discharges;

– produced electric and thermal energy (kWh) and energy resources consumed by generation facilities (coal, fuel oil and electric energy in terms of conventional fuel using appropriate coefficients[2]) in the model region (Zabaikalsky Krai).

The time frame of the research is determined by the availability of statistics on economic activities, which are presented for the period from 2005 to 2016. Two time intervals were covered:

1) 2005–2016 – to identify the decoupling in Russia and the regions of cross-border cooperation with China;

2) 2009–2016 – to assess the possible impact of the border position on the eco-economic development of the Eastern regions.

The assessment of energy intensity of electric and thermal energy generation in Zabaikalsky Krai was carried out for the period from 2009 to 2017.

Research results and their analysis

Impact decoupling. The analysis of the impact of economic activities on the environment in regions of cross-border cooperation shows that the situation cannot be characterized as quite good. During 2005–2016, pollutant emissions from stationary sources in the Amur and Irkutsk oblasts and the Republic of Buryatia increased. The formation of such type of environmental load in Eastern regions is provided by thermal power plants operating mainly on solid fuel. Despite the fact that the main volume of electric energy in the Irkutsk Oblast is generated at a relatively atmosphere-friendly water power plant of Angarskii cascade, the share of power generation accounts for more than 40% of total pollutant emissions from stationary sources[3].

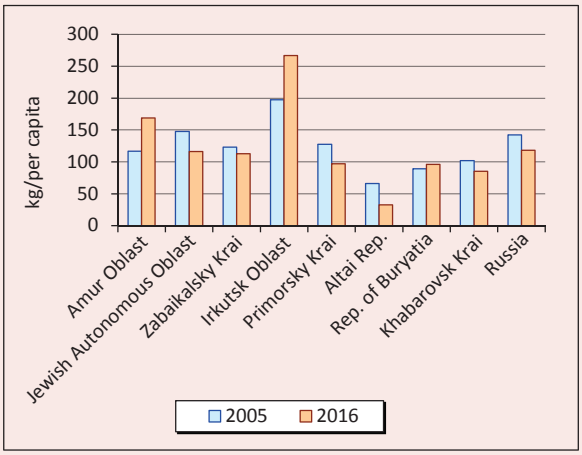
Figure 1 presents per capita indicators of environmental load in Russia and Eastern regions. In some of them, especially in the Irkutsk Oblast, the average Russian values for certain types of negative impact are significantly exceeded. Moreover, during the period under review in the Jewish Autonomous Oblast, the Republic of Buryatia, the Amur and Irkutsk oblasts there was an increase in total pollution.

To identify decoupling in the development of national and regional economies we calculated D_t coefficient. In all Russian regions, misalignment of trends in economic development and environmental pollution is manifested in relation to the discharge of contaminated wastewater (*Tab. 1*). In the period from 2005 to 2016, the D_t coefficient is positive, the value varies from 0.17 (Jewish Autonomous Oblast) to 0.70 (Zabaikalsky Krai). However, it is noteworthy that the relatively favorable situation in many regions may be explained by an insufficiently high quality of monitoring wastewater discharges into water bodies, rather than a really reduced negative impact. For example, in Zabaikalsky Krai cases of violations of environmental

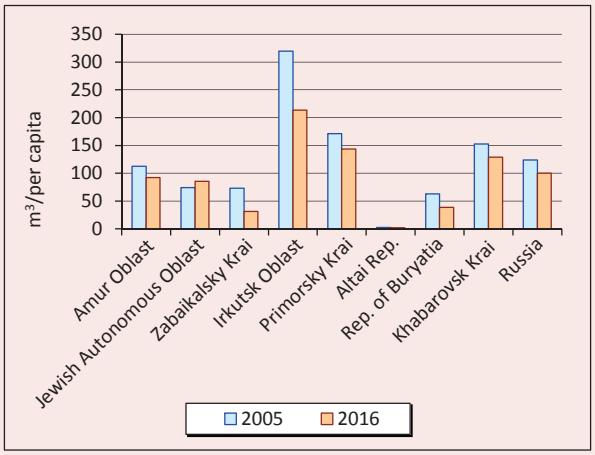
[2] Methodological provisions to calculate the fuel and energy balance of Russia according to the international practice. Available at: http://sro150.ru/images/docs/postanovlenie_goskomstat_19990623_N46.pdf (accessed: 16.03.2018).

[3] *Environment protection in the Irkutsk Oblast in 2016: state report.* Irkutsk: Megaprint, 2017. 274 p.

Figure 1. Per capita indicators of environmental load in Russia and regions of cross-border cooperation with China



a) contaminated wastewater discharge



b) atmospheric pollutant emissions from stationary sources

Calculated according to: *Russian regions. Socio-economic indicators*. Available at: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/publications/catalog/doc_1138623506156 (accessed: 14.06.2018).

Table 1. Impact decoupling coefficient (Dt) in regions of cross-border cooperation with China and Russia

Region/country	Contaminated wastewater discharge		Pollutant emissions from stationary sources		Emissions of most common pollutants from stationary sources									
					Sulphur dioxide		Carbon oxide		Nitrogen oxide		Solid waste		Hydrocarbons, including volatile organic compounds	
	2005 and 2016	2009 and 2016	2005 and 2016	2009 and 2016	2005 and 2016	2009 and 2016	2005 and 2016	2009 and 2016	2005 and 2016	2009 and 2016	2005 and 2016	2009 and 2016	2005 and 2016	2009 and 2016
Amur Oblast	0.39	0.15	**-0.07**	**-0.11**	0.21	**-0.03**	**-0.07**	**-0.01**	**-0.87**	**-0.69**	0.10	**-0.07**	**-5.07**	**-2.52**
Jewish Autonomous Oblast	0.17	**-0.002**	0.43	**-0.01**	0.42	0.15	0.28	**-0.05**	0.59	**-0.08**	0.49	0.01	0.38	**-0.002**
Zabaikalsky Krai	0.70	0.67	0.36	0.20	0.12	0.17	0.41	0.18	0.35	0.26	0.46	0.25	0.12	0.18
Irkutsk Oblast	0.63	0.40	0.25	0.15	0.18	0.13	**-0.003**	**-0.09**	0.002	0.22	0.56	0.36	0.61	0.32
Primorsky Krai	0.39	0.23	0.45	0.23	0.59	0.33	0.40	0.10	0.31	0.18	0.45	0.32	**-1.77**	**-1.42**
Altai Republic	0.39	**-0.16**	0.60	0.38	0.58	0.38	0.61	0.33	0.53	0.13	0.64	0.46	–	–
Republic of Buryatia	0.44	0.15	0.02	0.01	**-0.22**	**-0.10**	0.17	**-0.004**	**-0.09**	0.11	0.18	0.15	**-4.08**	**-3.52**
Khabarovsk Krai	0.33	0.20	0.34	0.11	0.46	0.30	0.07	**-0.04**	0.15	**-0.05**	0.57	0.37	**-0.59**	**-0.59**
Russia	0.38	0.21	0.37	0.22	0.36	0.22	0.44	0.24	0.18	0.10	0.54	0.37	0.23	0.18

Compiled from: *National accounts*. Available at: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/accounts/# (accessed: 23.05.2018); *Environmental protection in Russia*. Available at: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/publications/catalog/doc_1139919459344 (accessed: 24.05.2018). *Main indicators of environmental protection*. Available at: http: //www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/publications/catalog/doc_1140094699578 (accessed: 23.05.2018).

legislation are regularly recorded: illegal discharge of untreated wastewater by resource users[4] takes place. Moreover, many operating treatment facilities are almost dilapidated and do not ensure proper quality of wastewater treatment[5].

There is no decoupling regarding emissions from stationary sources in some regions (the Republic of Buryatia, the Amur and Irkutsk oblasts, Primorsky and Khabarovsk krais). This is most obvious when analyzing the situation in the context of most common pollutants. During the period of active development of cross-border relations with China (2009–2016) in some regions, the D_t coefficient takes negative values. This indicates that economic development is accompanied by intensified air pollution. In the Jewish Autonomous Oblast such a situation is observed in terms of total pollutant emissions, emissions of carbon monoxide, nitrogen oxides, and hydrocarbons.

The prospects for socio-economic development of Eastern territories are mainly associated with the expansion of mining, fuel and logging, and a significant part of the Russian-Chinese projects planned and already being implemented in Russian regions is focused primarily on the extraction and primary processing of mineral resources [18, 24]. Thus, an important aspect of the present research is the analysis of eco-economic development of the following economic activities: *mineral extraction* (Section C of the all-Russian MEA classifier operating in the study period), *processing* (Section D) and *production and distribution of electric energy, gas and water* (Section E). The results were visualized through a box plot [12], which demonstrates the distribution of the decoupling coefficient by analyzed MEA among the regions under review (*Fig. 2*). This type of data representation shows several values at the same time: the first and third quartiles (the lower and upper surface of the rectangle separated by 25 and 75% of the sample), the median (a marker inside the rectangle), the minimum and maximum values, and outliers (separate points that stand out from the total sample).

In terms of the negative impact on the atmosphere in most Eastern regions decoupling is recorded in the development of all three types of economic activities. In 2005–2016, the median value in all cases is over zero (see *Fig. 2a*). This suggests that at least 50% of all test values are positive.

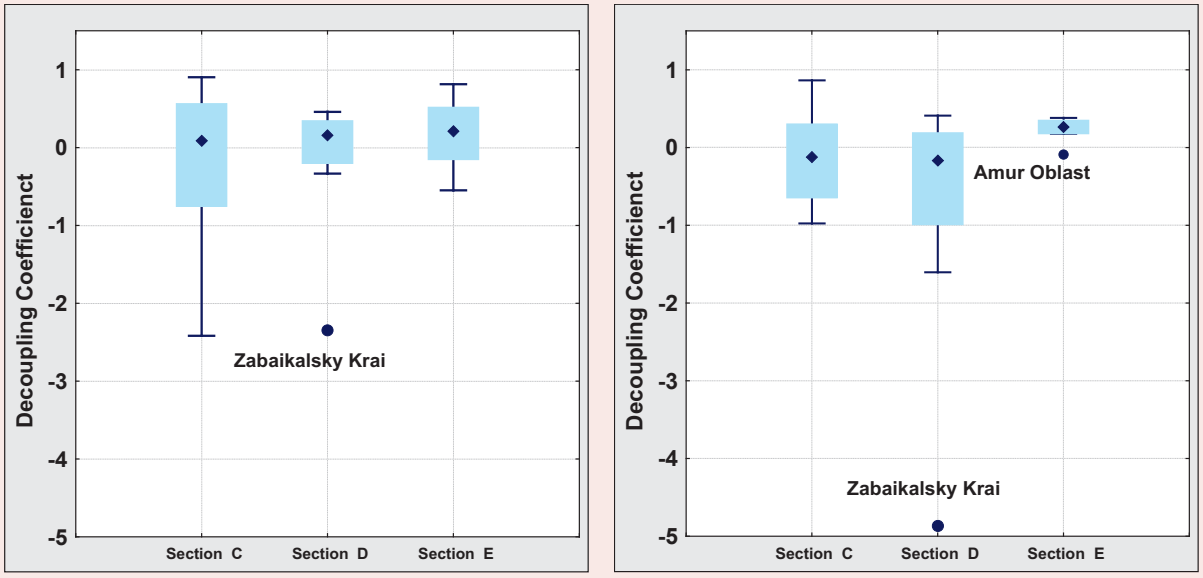
However, it does not exist in some entities. For example, the minimum value of the D_t coefficient in mining – in the Jewish Autonomous Oblast (D_t=-2.41), where the contribution of *Mining* in the region's gross value added in recent years has steadily increased. In 2017, industrial production index in mining grew 4.7 times compared to 2016[6]. This is explained by higher iron ore concentrate output due to the operationalization of the Kimkano-Sutarskii mining and processing plant, whose construction was among key projects of the

[4] Housing and communal services in Zabaikalsky Krai illegally dumped sewage into the settlement lake. Available at: https://www.chita.ru/news/115752/ (accessed: 27.06.2018); Environmental Prosecutor revealed cases of millions of cubic meters of contaminated water dumped into the River Khilok in Zabaikalsky Krai. Available at: https://baikalproc.ru/v-zabajkalskom-krae-prirodoohrannyj-prokuror-vskryl-fakty-sbrosa-millionov-kubometrov-zagryaznyonnyh-stokov-v-r-hilok/ (accessed: 27.06.2018).

[5] Environmental Prosecutor's Office demand in court that new sewage treatment facilities are constructed on the Selenga River. Available at: http://snews.ru/news/prirodoohrannaya-prokuratura-cherez-sud-potrebovala-postroit-novye-ochistnye-sooruzheniya-na (accessed: 27.06.2018).

[6] Information of the results of monitoring study of forecasts of the socio-economic development in the Jewish Atonomous Oblast for 2017. Available at: http://www.eao.ru/o-eao/sotsialno-ekonomicheskoe-razvitie-eao-/prognoz-sotsialno-ekonomicheskogo-razvitiya/ (accessed: 04.07.2018).

Figure 2. Impact decoupling coefficient (D_t) distribution among regions of cross-border cooperation: pollutant emissions from stationary sources



a) 2005 and 2016 b) 2009 and 2016

Compiled from: *National accounts*. Available at: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/accounts/# (accessed: 23.05.2018); *Environmental protection in Russia*. Available at: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/publications/catalog/doc_1139919459344 (accessed: 24.05.2018). *Main indicators of environmental protection*. Available at: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/publications/catalog/doc_1140094699578 (accessed: 23.05.2018).

Cross-Border Cooperation Program[7]. Now this enterprise is one of the main sources of atmospheric pollutants in the Jewish Autonomous Oblast[8]. In another border region – the Amur Oblast – the misalignment of economic growth and negative impact on the atmosphere has not been revealed in all sectors, while rapid development of border relations with the dynamically developing China does not change the situation. The value of decoupling coefficient is negative for all MEA (*Tab. 2*).

Data in Table 2 suggest that the eco-economic development of processing industries in some regions was characterized by lack of decoupling (Zabaikalsky Kai, the Amur Oblast, republics of Altai and Buryatia). The minimum D_t value (indicated by a dot in Figure 2 because it stands out from all the values) is marked in Zabaikalsky krai, where *Processing* ensure a small contribution to gross value added (2.8–4% in current prices). At the same time, during the period of active development of the Russian-Chinese relations, we observe a more unfavorable situation: the value of the studied indicator is significantly lower (D_t=-4.87) than the value obtained for the time interval from 2005 to 2016 (D_t=-2.34). In recent years, this region has preserved the downward trend in production in processing industries (except

[7] *Cooperation program between the regions of the Far East and Eastern Siberia of Russia and North-East China (2009–2018)*. Available at: http://www.chinaruslaw.com/RU/CnRuTreaty/004/201035210624_735729.htm (accessed: 24.05.2018).

[8] *Sustainable development. 2016: annual report*. Petropavlovsk–Chernaya Metallurgiya Group. Available at: http://www.petropavlovsk-io.ru/netcat_files/userfiles/1/Godovoy_otchet_GK_PChM_2016.pdf (accessed: 04.07.2018).

Table 2. Impact decoupling coefficient (D_t) in regions of ross-border cooperation with China and Russia: pollutant emissions from stationary sources

Region/country	Section C "Mineral extraction"		Section D "Processing"		Section E "Production and distribution of electric energy, gas and water"	
	2005 and 2016	2009 and 2016	2005 and 2016	2009 and 2016	2005 and 2016	2009 and 2016
Amur Oblast	**-0.75**	**-0.65**	**-0.07**	**-0.38**	**-0.34**	**-0.09**
Jewish Autonomous Oblast	**-2.41**	0.14	0.43	0.00	0.82	0.35
Zabaikalsky Krai	0.91	0.86	**-2.34**	**-4.87**	0.05	0.35
Irkutsk Oblast	0.46	**-0.14**	0.20	0.27	0.25	0.18
Primorsky Krai	**-0.68**	**-0.98**	0.46	0.41	0.29	0.23
Altai Republic	-	-	**-0.33**	**-1.61**	0.75	0.38
Republic of Buryatia	0.57	0.30	0.13	**-0.34**	**-0.54**	0.30
Khabarovsk Krai	0.09	**-0.13**	0.27	0.10	0.18	0.17
Russia	0.33	0.14	0.38	0.31	0.23	0.19

Compiled from: *National accounts*. Available at: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/accounts/# (accessed: 23.05.2018); *Environmental protection in Russia*. Available at: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/publications/catalog/doc_1139919459344 (accessed: 24.05.2018). *Main indicators of environmental protection*. Available at: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/publications/catalog/doc_1140094699578 (accessed: 23.05.2018).

for food processing and other industries)[9]. At the same time, the negative impact on the atmosphere produced by processing enterprises has increased significantly over the period under review: pollutant emissions increased more than three times compared to 2005.

In regions of cross-border cooperation, *Production and distribution of electricity, gas and water* provides from 3.6% (Primorsky Krai) to 7.3% (the Amur Oblast) of GRP[10]. Production of heat and electricity, as well as mineral extraction has a complex impact on the environment. In the regions under consideration, production of electric and thermal energy is carried out mainly at coal power plants whose emissions includes pollutants such as solid particles (soot), sulfur dioxide, nitrogen oxides and carbon monoxide. Power engineering companies account for 46% (Irkutsk Oblast) to 74% (Amur Oblast) of the total atmospheric pollutants from stationary sources[11]. The most noticeable increase in the contribution of this industry to total pollution compared to 2005 is recorded in the Amur Oblast, Zabaikalsky Krai and the Republic of Buryatia (for the considered time interval in these regions, emissions from power engineering enterprises increased by more than 1.3 times).

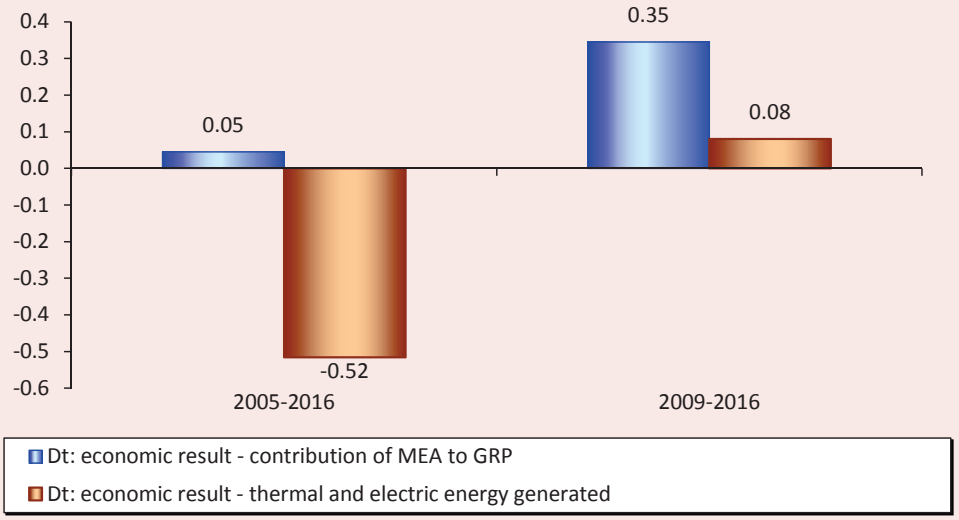
Analysis of data characterizing the eco-economic development of electric engineering helps conclude that there is no decoupling in two regions: the Amur Oblast and the Republic

[9] Information of the results of monitoring study of forecasts of the socio-economic development in Zabaikalsky Krai for January–December, 2016. Available at: http://минэконом.забайкальскийкрай.рф/action/monitoring-socialno-ekonomicheskogo-polojeniya-/2016/ (accessed: 04.07.2018).

[10] *National accounts*. Available at: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/accounts/# (accessed: 23.05.2018)

[11] *Main indicators of environmental protection*. Available at: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/publications/catalog/doc_1140094699578 (accessed: 23.05.2018).

Figure 3. Decoupling coefficient (D_t) for Zabaikalsky Krai's power engineering: pollutant emissions from stationary sources



Calculated according to: *Statistical yearbook of Zabaikalsky Krai, 2011*. Chita, 2011. 299 p; *Zabaikalsky Krai–2016*. Chita, 2017. 311 p.

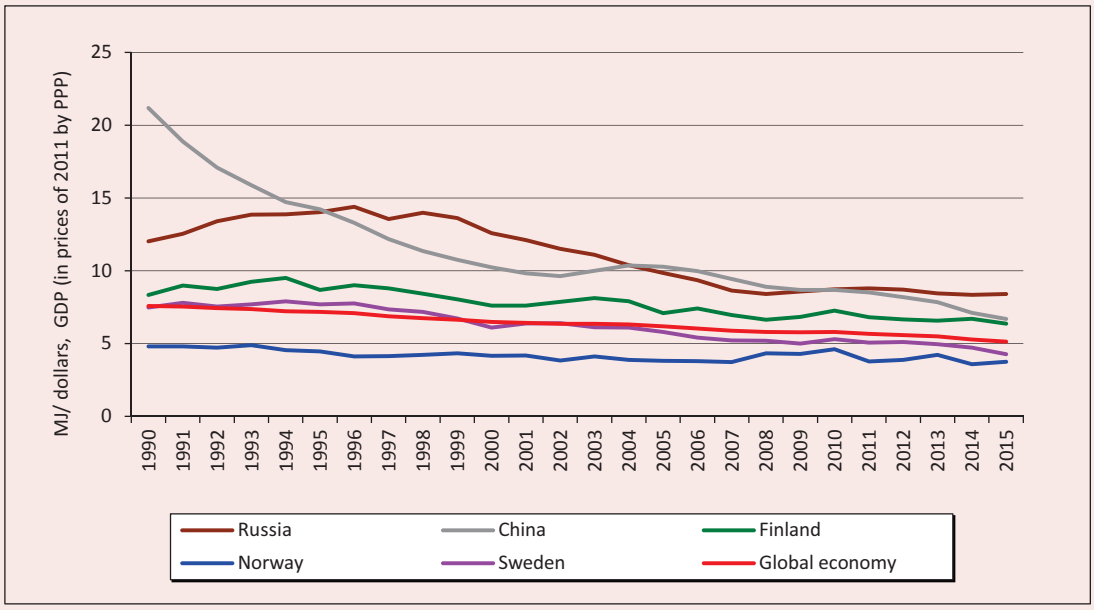
of Buryatia (for 2005–2016). In other cases, there is a separation of economic development trends and air pollution. The highest D_t values are recorded in the Jewish Autonomous Oblast and the Altai Republic, both with a significant decrease in the environmental load during the considered time interval. However, it is noteworthy that the use of natural quantities as an economic result (for example, an indicator such as the amount of heat and electricity generated, kWh) in calculations may slightly change the resulting situation. This is demonstrated by analysis of one of the border regions –Zabaikalsky Krai (*Fig. 3*).

During 2005–2016, D_t takes a negative value (D_t=-0.52), which indicates the absence of decoupling in the development of power engineering in the region. Thus, the performance of cost indicators is influenced by the effect of rising tariffs for thermal and electric energy.

Resource decoupling. Achieving resource decoupling, which implies reduced consumption of primary resources per unit of economic result, is a pressing challenge for further development of Russia. The study of the nature of economic development of Russian regions shows that most of them develop due to natural resource consumption [25]. To date, Russia's economy is recognized as one of the most energy-intensive economies in the world [26]. *Figure 4* reflects the performance of primary energy consumption per unit of economic output (GDP) in different countries.

There is a noticeable gap in this indicator even between countries with similar climatic conditions. Thus, in Sweden and Norway, which, like Russia, belong to Northern countries, energy consumption per dollar of GDP at purchasing power parity is 1.7 and 2.2 times lower, respectively (according to 2014 data). In [26] it is noted that apart from

Figure 4. Performance of indicator characterizing primary energy consumption efficiency (energy intensity), 1990–2015



Source: Energy intensity level of primary energy (MJ/$2011 PPP GDP). Available at: https://data.worldbank.org/indicator/EG.EGY.PRIM.PP.KD (accessed: 26.03.2018).

climatic and geographical conditions, an important factor contributing to high energy intensity is the sectoral structure of economy. Its peculiarity in Russia is the predominance of heavy industries which require a great amount of energy resources.

To assess energy resource consumption efficiency in Russian regions we use "GRP energy intensity" indicator. It is regularly published by the Federal State Statistics Service of Russia. *Table 3* presents GRP energy intensity in the regions of cross-border cooperation with China. In most of them energy costs per unit of value added are higher than in Russia as a whole. However, it is noteworthy that the indicator has shortcomings and does not fully reflect the real situation. This is due to the peculiarities of statistical accounting: the amounts of consumed energy resources belongs to one region, while part of GRP created in its territory – to another region due to business identification according to its main location[12]. Moreover, a marked decrease in energy intensity relative to the level of the previous year was mainly due to GRP growth, which is measured in current prices (i.e., the inflation component is not taken into account). To assess the performance of energy intensity it is more reasonable to use the "Consumption of fuel and energy resources per one employed in economy" indicator. During 2012–2015, its value in Russia did not actually change (13 tons of oil equivalent per one employed in economy)[13].

[12] Energy intensity monitoring. Implementing the policy of increasing energy intensity based on analysis of energy intensity of products of industrial enterprises in the Novgorod Oblast for 2015–2016. Available at: http://nnov.tpprf.ru/ru/business/energ/otchety.php?clear_cache=Y (accessed: 26.03.2018).

[13] Consumption of fuel and energy resources per one employed in the country's economy. Available at: https://fedstat.ru/indicator/50164 (accessed: 26.03.2018).

Table 3. GRP energy intensity, kg of oil equivalent/10,000RUB.

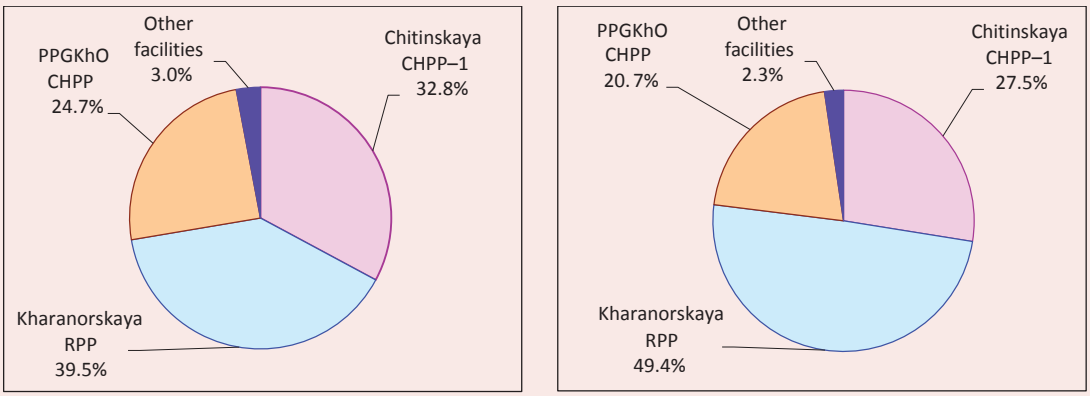
Region/country	2014	2015	Change over 2014–2015
Altai Republic	142.74	130.48	-9%
Republic of Buryatia	186.36	173.65	-7%
Zabaikalsky Krai	195.80	177.90	-9%
Irkutsk Oblast	338.50	252.41	-25%
Primorsky Krai	167.40	129.11	-23%
Khabarovsk Krai	133.61	126.01	-6%
Amur Oblast	188.43	166.30	-12%
Jewish Autonomous Oblast	167.16	144.13	-14%
Russia*	150.31	136.11	-9%

* The indicator represents the ratio of consumption of fuel and energy resources by Russia's constituent entities to their GRP.
Compiled from: *Technological development of economic sectors. GDP (GRP) energy intensity*. Available at: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/economydevelopment/# (accessed: 26.03.2018).

Due to lack of information characterizing consumption of energy resources by economic activity it is difficult to assess energy intensity of individual industrial sectors in regions. In this regard, we only analyzed resource efficiency for electric power industry of one of the border regions – Zabaikalsky Krai.

The largest electric and thermal energy generation facilities in the border region are: Haranorskaya regional power station, Chitinskaya CHPP–1 and OAO "Priargunskoe proizvodstvennoe gorno-khimicheskoe ob"edinenie" (PPGKhO) CHPP (*Fig. 5*). A small share of production (2.4%) accounts for other generation facilities, which include Chitinskaya CHPP–2, Sherlovogorskaya, Priargunskaya and Pervomayskaya CHPP. During 2009–2017, the structure of power generation in the region changed significantly. The share of Haranorskaya regional power station in total generation increased significantly; in 2017, it provided almost half of the total volume of generated electrical energy.

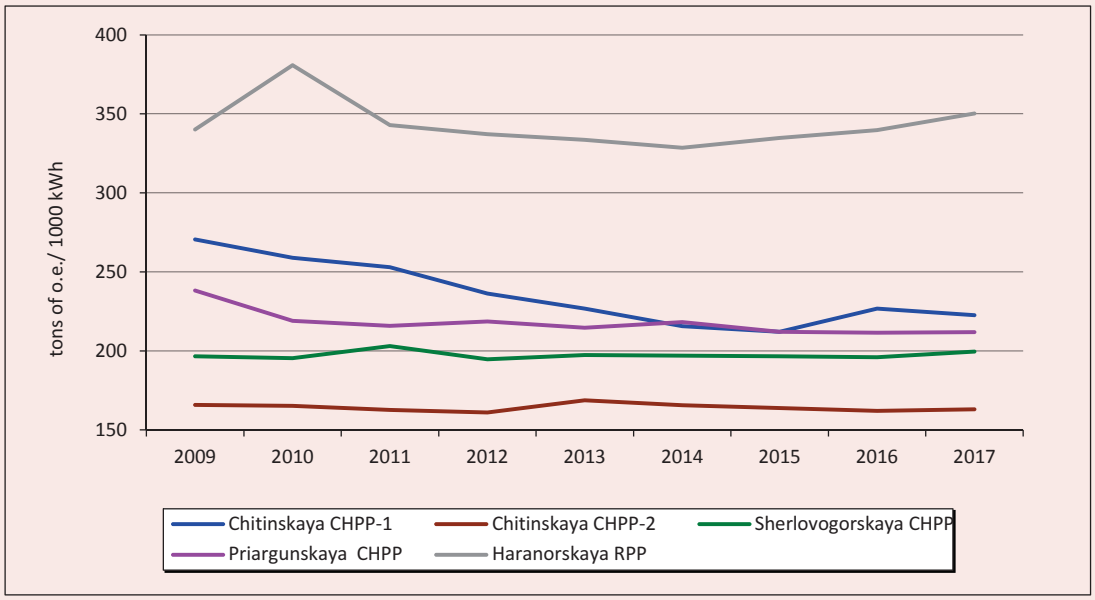
Figure 5. Structure of electricity production, TRANS-Baikal territory



a) 2009 b) 2017

Source: data of PAO TGK-14, AO Inter RAO – Elektrogeneratsiya, and branch of AO "SO EES Zabaikal'skoe RDU.

Figure 6. Performance of electric and thermal energy production energy intensity indicators by generation facilities in Zabaikalsky Krai, 2009–2017



Calculated according to: data of PAO TGK-14, AO Inter RAO – Elektrogeneratsiya and branch of AO "SO EES Zabaikal'skoe RDU.

All reviewed power generation facilities in Zabaikalsky Krai use coal from local brown coal deposits and fuel oil as fuel, whose share in fuel balance is insignificant[14]. Energy intensity is calculated as the ratio of volume of energy resources consumed in production process (coal, fuel oil and electricity in terms of oil equivalent) to electricity and heat produced (recalculated as kWh). The use of natural values as an economic result makes it possible to exclude the influence of inflation factor on the performance of the indicator under review.

Power engineering enterprises in Zabaikalsky Krai are characterized by different degrees of energy consumption per volume of final products (*Fig. 6*). In 2017, the indicator value varied in the range from 163 kg (Chitinskaya CHPP–2) to 350 kg (Kharanorskaya regional power station) of oil equivalent per 1000 kWh of thermal and electric energy generated.

In [23] it is noted that the use of primary energy resources in power plants with cogeneration technology, i.e. joint production of electricity and heat, is the most effective. This is confirmed by the results of calculations, according to which the largest power plant in the region – Kharanorskaya regional power pant – has the highest indicator value; the plant produces mainly electrical energy. For the considered time interval, a positive change was observed in two generation facilities: Chitinskaya CHPP–1 and Priargunskaya CHPP. Energy intensity of production at these plants decreased by 18 and 11%, respectively.

Conclusion

To sum up, we conclude that in all covered regions of cross-border cooperation with China decoupling is manifested in terms of contaminated wastewater discharge. However, such a relatively good situation may be due to insufficient quality of monitoring of wastewater discharge and the fact that the consequences of violating environmental legislation are not properly reflected in statistical reporting, rather than a real decrease in the level of this type of environmental load.

When it comes to pollutant emissions from stationary sources, decoupling, i.e. a mismatch of trends in economic development and air pollution, was detected in most cases. However, in some regions this effect is not clear, which is most evident in the analysis of the situation in the context of the most common pollutants and the main economic activities. At the same time, rapid development of border relations with China in recent years has not significantly changed the situation in Eastern regions. Paper [22] notes that the advantages of the border position, which in the East of the country were associated with great expectations due to the proximity of the fast-growing economy of China, did not become a significant impetus to socio-economic development and welfare, an important component of which is a favorable environment.

The studies presented in this article are aimed at solving the scientific problem of assessing the eco-economic development of Eastern regions-participants of cross-border cooperation. This determines their contribution to the development of theoretical and applied knowledge. The analysis results can be used in the development of management decisions in environmental and economic interactions, as well as in the preparation of strategic planning documents. A comparison of economic development and environmental pollution rates in the context of main economic activities may be useful when considering investment projects planned in the region, including initiatives involving foreign investment. In order to achieve decoupling for certain types of negative environmental impact, a set of measures is required in order to improve the environment protecting mechanism (increasing payment rates for negative impact, restoring their target use, etc.).

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VIII International research-to-practice conference "Strategy and Techniques of Socio-Economic Reforms: Regional Aspect"

According to the "Strategy of economic security of the Russian Federation up to 2030", one of the challenges to the country's economic security is uneven spatial development and increasing differentiation of regions and municipal units in terms of the level and pace of socio-economic development. In order to overcome the challenges it is necessary to better disclose the potential of each region, create a favorable social climate taking into account their advantages and profile.

The VIII International research-to-practice conference "Strategy and Techniques of Socio-Economic Reforms: Regional Aspect" held in Vologda (December, 12–14th, 2018) at the Vologda Research Center of the Russian Academy of Sciences was devoted to the search for opportunities and mechanisms for creating such conditions. The main focus of the conference supervisors was to find ways and effective tools for implementing socio-economic reforms that will ensure that Russia achieves sustainable development goals. In their opinion, much of this development depends on Russian regions.

The conference included 4 sections, a plenary session and the XVIII International research-to-practice conference "Young scientists for region's economy". In total, 111 people from 13 regions of Russian, from Belarus, Armenia and Donetsk People's Republic presented their research reports at the conference.

The key event of the conference was the plenary session which was attended by 300 people – leading Russian researchers, representatives of universities and academic institutions, managers and experts of federal, regional and local governments, teachers, students and graduate students. Well-known Russian economists and sociologists made a speech at the Government of the Vologda Oblast, including RAS academician V.M. Polterovich, RAS Corresponding Member V.N. Lazhentsev, Doctor of Economics D.B. Kuvalin, Doctor of Sociology V.V. Lokosov, and Doctor of Sociology V.V. Markin. The conference was supported by the Government of the Vologda Oblast, the Vologda City Administration, the Ministry of Science and Higher Education, and the Russian Academy of Sciences.

The Oblast's Deputy Governor Vitalii Valer'evich Tushinov noted at the opening of the plenary session that creating and developing applied science is impossible without the development of fundamental science; and without the development of applied science an economic breakthrough is unachievable. He stressed that the conference can become a platform for beneficial cooperation between public authorities and the scientific community.

The first part of the plenary session covered the problems of regions' sustainable development and improving the quality of public administration. RAS Academician, Deputy

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Director of Lomonosov Moscow State University, *Viktor Meerovich Polterovich* made a report on "The Institutions of Catching-up Development and the Problems of Regions' Economy Modernization". In his opinion, the goal of Russia's long-term development strategy is to catch up with Western European countries in terms of well-being, technology and human capital, development of civil society; to achieve the same level of GDP (GRP) per capita taking into account the purchasing power parity of at least 50% of per capita US GDP. Polterivich stressed that few developing countries have achieved such success. Among them are the countries of the so-called "economic miracle", whose experience should be adopted, yet taking into account the fact that direct adoption of Western phenomena is not always useful and the needs of developing and developed countries can be very different from each other.

According to V.M. Polterovich, all of these "miracle" countries used indicative planning and had a specialized agency for strategic planning. In his opinion, the key to a reform could be the creation of such a federal agency for development headed by a talented leader. He explained that the role of institutions of catching-up development lies in stimulating the development of a region based on one of the most advanced regions of Russia – the Republic of Tatarstan.

RAS corresponding member, *Vitaly Nikolaevich Lazhentsev* (Institute of Socio-Economic and Energy Problems of the North Komi Science Center, Ural Branch of RAS) spoke about the natural resource economy and its role in the strategic development of Northern regions. He stressed that the challenges in environmental management are not in "to mine or not to mine", but in a variety of ways to assess resource capacities and their correct use. Lazhentsev believes that the leading position, especially in the Arctic and Northern regions, should be given to bio-resource economy, first of all, to the land fund. He highlighted several priority objectives in this field: the distribution of the entire land fund and all agricultural land by ownership and use; increasing the role of municipal units in land use management; arranging forestry according to international regulations, and restoration of forestry enterprises as organizers of forest resource reproduction.

The main problems of Russia's spatial development and their possible solutions were covered in the report of *Dmitry Borisovich Kuvalin*, Doctor of Economics, Deputy Director at Institute of National Economic Forecasting of RAS. He highlighted the strong inequality in regions' development and the associated outflow of able-bodied and skilled population to the most developed economic centers. In his opinion, lack of sources in the regions is determined by controversial shares of tax income redistribution in favor of the federal center. D.B. Kuvalin proposed to leave more resources to regions, to ease bureaucratic pressure in terms of regulations on the use of funds, and to establish an agency that would be responsible for the development of the regional policy.

The second part of the plenary session was devoted to contemporary problems of the socio-economic development of in Russian regions. Director of the Vologda Research Center of RAS, Alexandra Anatol'evna Shabunova, who presented the report "Socio-demographic challenges of regional development", noted that the demographic challenges include the transformation of the demographic structure, in particular the ageing of the world population. Moreover, the basic social institutions of family and marriage are being transformed: family relations are becoming more unstable, single- and two-child families are becoming more widespread. The problems of resettlement – compression of developed space of rural territories of Russia, concentration of the rural population in certain zones – are mounting.

An important aspect of modern development is the transformation of the information and communication space. The development of telecommunications can help increase the connectivity of space, as well as the availability of services (including education and health) both at the personal level and from the point of view of social development, which is especially

important for Russia with its vast territories. At the same time, Russia's lagging behind the world's leading states in the development of digital technologies and the widening gap between urban and rural areas in the coverage of modern technologies exacerbate the existing problems. The introduction of new digital technologies entails changes in professional knowledge and skills. This determines the need to improve the system of vocational education.

Concluding her speech, A.A. Shabunova stressed that in order to form a harmonious society it is important to take into account both social and technological challenges, otherwise the balance in the functioning of system elements is disturbed, which in turn leads to its deformation and destabilization and the growing social tension.

Doctor of Sociology, Director of Institute of Socio-Economic Studies of Population of the Russian Academy of Sciences (ISESP RAS), *Vyacheslav Veniaminovich Lokosov* spoke about the possibilities of applying the method of extreme critical indicators to implement national priorities. As he noted, weak scientific justification of target strategic priorities leads to problems in their implementation. He gave an example of the situation with a number of targets set by 2012 May decrees of President of Russia (May 7th, 2012), according to which by 2018 the working hours were to grow by half, but in fact this parameter increased by only 6%. The reason for the stagnating social sphere, in his opinion, lies in several factors: the stagnation of wages around the world with continuously growing corporate income; the reduced share of economically active population; the reduced number of new jobs and the prolonged unemployment; rapidly growing inequality and polarization; increased part-time employment; the declining income and the growing unemployment among college graduates. Vladimir Lokosov briefly described the method of using extreme critical indicators, which, in his opinion, can be used in regional strategies for socio-economic development.

Vyacheslav Nikolaevich Bobkov, Doctor of Economics, Head of the Laboratory for the Standard of Living and the Quality of Life at ISESP RAS focused on the results of the pilot project to strengthen the targeting of social support and economic sustainability of low-income families with children. Together with the Department of Social Security of the Vologda Oblast, the project developed a new model of support for low-income families that would help them increase their income to a higher level than the level of the existing social support system. According to him, the experience of the Vologda Oblast in social security makes it one of the pilot regions of the Ministry of Labor of the Russian Federation to continue the strengthening of targeted social support and economic stability of this category of families.

Lyudmila Sergeevna Siluanova, Candidate of Sciences (Economics), Director of the Higher School of Economics, Management and Law at Northern (Arctic) Federal University (NArFU), made a report "Involvement of Young People in the Strategic Management of a Region as a Response to Migration Risks of Northern Territories" and focused on the prospects of increasing the migration attractiveness of Northern Russian territories, especially for the younger generation. In her opinion, it is necessary to provide young people with opportunities for self-development: participation in socially important volunteer projects and key projects in a region, acquire modern education in demand in the labor market. Siluanova spoke about the experience of NArFU in the implementation of network programs to provide world-class education, educational programs based on an "enterprise-university" model and practice-oriented training of students, as well as examples of young people' involvement in the processes of change management at the regional and municipal level.

Doctor of Sociology, Professor *Valerii Vasil'evich Markin* (Institute of Sociology of the Federal Research Center for Sociology of the Russian Academy of Sciences) analyzed the strategies and political and managerial practices of spatial development in Russia. He believes that after harsh criticism of the draft

spatial development Strategy of the Russian Federation, the content of this document has been significantly improved but it can work only if regional strategies are developed based on its conceptual provisions. According to the researcher, however, the analysis of current regional practices shows the inertial, reduction-administrative understanding of the problem of spatial development in Russia. The mechanisms to address this problem are public-municipal-private partnership on a high-tech basis, small and medium businesses, inter-regional and inter-municipal cooperation, social capital, comfortable environment, etc.

Mikhail Vladimirovich Morev, Head of the Laboratory for Social Processes and Public Administration Efficiency of the Vologda Research Center of the Russian Academy of Sciences, in his report "Regional Trends of Institutional Trust" focused on the increasing role of trust in the modern world. He noted that Russia does not possess a high level of institutional and interpersonal trust. In his opinion, the problem of low trust is caused by factors related to historical, socio-cultural characteristics of the country, with the transformation that took place in recent decades, as well as with modern problems of public administration efficiency. Against the background of increased tensions between the society and the authorities, the level of trust can serve as an indicator of how long-term and systemic this crisis will be.

The report of *Sergey Aleksandrovich Kozhevnikov*, Candidate of Sciences (Economics), Head of the Laboratory of Spatial Development and Productive Forces of the Vologda Research Center of RAS, touches upon the prospects of participation of the regions of the European North in the development of the Russian Arctic zone. The researcher believes that a huge natural resource potential of the European North and the Arctic (ENR) is not fully used as post-Soviet transformations have disrupted economic ties with other regions and destroyed the infrastructure and human capital of ENR. The problems of these territories include the reduction of local population, the "primitivization" of their economy and the predominance of low redistribution production, crisis phenomena in agriculture, the reduction of cargo turnover, etc. It was concluded that there is a need for technological modernization of the Northern and Arctic territories, as well as competent management of transport and logistics infrastructure development.

Four sections were organized within the framework of the conference.

Section 1 "Problems of economic growth and sustainable development of territories" included a very wide range of issues, including the most acute problems of economic growth, economic security and spatial development of regions in the post-transformation period; the potential of Russian territories; various aspects of sustainable development; methodology and tools for managing socio-economic processes at the territorial level, etc.

The section was attended by the representatives of 12 institutions of science and higher education from various Russian regions and neighboring countries. Twenty-one reports were presented. Tamara Vitalievna Uskova, Deputy Director for Science of the Vologda Research Center of the Russian Academy of Sciences, Doctor of Economics, highlighted the key challenges for Russia's economic security. Maria Aleksandrovna Pechenskaya, Senior Researcher, Head of laboratory, Candidate of Sciences (Economics), spoke about the development of the budget potential of Russian territories in the context of ensuring the country's economic security. The reports of Yulia Georgievna Lavrikova (Director of the Institute of Economics of the Russian Academy of Sciences (Ural branch)); Maxim Vital'evich Fomin (senior researcher at the Department of Urban Geography and Spatial Development of the Institute of Socio-Political Studies of the Russian Academy of Sciences, Candidate of Sciences (Political Science)); Marina Vital'evna Moroshkina (researcher at the Institute of Economics of the Karelian Research Center of

RAS), and Elena Sergeevna Gubanova (Head of the Department of Finance and Credit of Vologda State University, Doctor of Economics, Professor) were focused on spatial development.

Various aspects of economic growth and its contributing factors were presented in reports of Lyudmila Mikhailovna Rozanova (senior researcher at Institute of Economics of Karelian Research Center of RAS, Candidate of Sciences (Economics) and Yulia Mikhailovna Pasovets (associate professor at the Department of Sociology and Political Science of Kursk State University, Candidate of Sciences (Sociology)). The tools for assessing the average position of Russian regions in the value chains were reviewed by Evgenii Vladimirivich Lukin (deputy head at the Vologda Research Center of the Russian Academy of Sciences (VolRC RAS), leading researcher, Candidate of Sciences (Economics)).

Anna Ivanovna Povarova (VolRC RAS researcher) and Aleksei Yevgenevich Mel'nikov (junior researcher at VolRC RAS) spoke about economic problems of regional development.

The issues of territories' sustainable development, various factors hindering this process were focused on by Aleksandr Borisovich Doveiko (associate professor at the Department of Sociology and Political Science at Voronezh State University, (Candidate of Sciences (Sociology)), Valerii Kuz'mich Egorov (Head of the International Department of Institute of Socio-Economic Studies of Population of RAS, Candidate of Sciences (History)); Pavel Mikhailovich Sovetov (Professor at the Department of Production Management at Vologda State Dairy Farming Academy by N.V. Vereshchagin, Candidate of Sciences (Economics)); Inna Mikhailovna Shneiderman (head of laboratory at Institute of Socio-Economic Studies of Population of RAS, Candidate of Sciences (Economics), associate professor) and Alla Konstantinovna Guzanova (senior researcher); and Elvira Olegovna Orlova (associate professor at Vologda State University, Candidate of Sciences (Economics).

Section 2 "The Socio-Demographic Development of Regions: Problems and Prospects" covered the following topics: civilizational potential of local territories' development in the North-West of Russia; demographic aspects of Russia's spatial development; regional features of the process of demographic aging in Russia; transformation of an institution of family and its role in the formation of children's human potential; the standard of living of retirees in Russia; the quality of working life; economic priorities of a young family; index approach to studying Russia's social potential, etc.

Among the most significant results of the section is a new view on the development of local territories and its civilizational potential proposed by Director of RAS Institute of Sociology – branch of the RAS Federal Research Center for Sociology – Doctor of Philosophy, Vladimir Vyacheslavovich Kozlovskii. Vadim Aleksandrovich Bezverbnyi (Deputy Director for strategic development at Institute of Socio-Political Research of RAS (ISPI RAS), head of the Department of Urban Geography and Spatial Development, Candidate of Sciences (Economics), associate professor at the Department of Demographic and Migration Policy at MGIMO University (Moscow)) put an emphasis on the correlation between demographic and territorial development of Russian regions, especially in the context of the Concept of spatial development of the country. As for the development of the theory of studying the performance of the age composition of the population, V.N. Barsukov (researcher at VolRC RAS) proposed an understanding of population aging as a holistic, structural and systemic "phenomenon" caused by a set of processes of changes in the demographic, economic and social space. The definition of ageing as "an increase in the share of elderly people" narrows down the perception of ageing to a cause without the consequences. T.A. Guzhavina (leading researcher at VolRC RAS, Candidate of Sciences (Philosophy)) presented the methodology and results of assessing social capital, according to which one third of the population has social capital above the average level. During the discussion it was recommended that it be

considered in the context of the concept of population quality. The report of Z.A. Hotkina (leading researcher of the laboratory of gender problems of ISEPN RAS (Moscow), Candidate of Sciences (Economics)) was devoted to the problem of gender differences in social status, in particular, health and wages, which remains relevant in Russia and globally. According to her, significantly weaker health status of men compared to women is a major challenge to the socio-economic development of the country. S.V. Kroshilin (associate professor at the Department of Economics and Management of the Faculty of Economics of State Socio-Humanitarian University (Kolomna)) spoke about the need to take into account the changes in the labor market in the system of training in the era of robotics, about the focus on the development of professional soft skills. The situation with the development of school education is also severe. M.A. Golovchin (senior researcher at VolRC RAS, Candidate of Sciences (Economics)), presenting the results of the study of reforms, noted the divergence existing in the socio-professional community of teachers, which is manifested in varying degrees of adaptability to the transformations taking place in school, different attitudes to changes in education, low activity in professional associations. The section included the issues of mental and social health, trends in educational migration, development of social infrastructure, quality of life, and the development of civil society. One of the general conclusions of the section was the recognition of the need to improve statistical accounting and monitoring system of socio-economic development, create accessible databases on the results of regional studies conducted on a single methodological basis.

The main objective of *Section 3 "Scientific and technological development of territories: regional trends and practices"* was to find and substantiate ways to develop scientific and technological space, trigger innovative processes in the regions to improve the competitiveness of the national economy and create conditions for improving the quality of life and human development.

15 reports were presented at the section. It was attended by M.S. Sokolov (Candidate of Sciences (Economics), associate professor at the Department of State and Municipal Administration at Plekhanov Russian University of Economics), A.A. Kobylko (Candidate of Sciences (Economics), leading researcher at Central Institute of Economics and Mathematics of RAS), V.N. Makoveev (Candidate of Sciences (Economics), academic secretary at Vologda State University), A.I. Metlaykhin (Candidate of Sciences (Economics), associate professor at the Department of Economic Theory, Accounting and Analysis at Vologda State University), I.M. Gulyi (Candidate of Sciences (Economics), associate professor at the Department of Transport Economics at Emperor Alexander I St. Petersburg State Transport University), S.N. Mishchuk (Candidate of Sciences (Economics), head of laboratory at Institute for Complex Analysis of Regional Problems of ERIFER RAS), and V.S. Uskov (Candidate of Sciences (Economics), senior research at the Laboratory of Innovation Economy at VolRC RAS).

The practical focus of the session confirms the interest of the real sector of economy. Thus, S.E. Elgaev, Director General at ZAO Mezon, spoke about the experience of creating a high-tech machine-building production in the region, as well as the difficulties and prospects of its development.

The participants of the event highly acknowledged him, noting that they had the opportunity to summarize their own research experience, get acquainted with the results of the research works of their colleagues and representatives of the real sector of economy.

Section 4 "Agricultural science and its role in ensuring the socio-economic development of the region" included discussion of the following issues: the impact of agriculture on the economic development of the Vologda Oblast; approaches to managing the development of rural areas in Russia; the role of cooperative forms of agriculture in the region; the development of feed production based on modern technologies; modern methods of sampling feed; the

development of dairy cattle breeding in the European North of Russia; food security in the regions, the development of agricultural production; problems and prerequisites for the development of biotechnology in the Vologda Oblast. The program of the section included a discussion of problems of promoting new scientific achievements and finding ways to develop the industry of dairy farming and feed production.

This section organized by Northwestern Dairy Farming and Grassland Management Research Institute – branch of VolRC RAS – was attended by 45 researchers and experts from ten organizations: Northwestern Dairy Farming and Grassland Management Research Institute, Yaroslavl Yaroslavl Scientific Research Institute of livestock breeding and forage production — Federal State Budget Scientific Institution "Federal Williams Research Center of Forage Production and Agroecology", the Department of Agriculture and Food Resources of the Vologda Oblast, Vologda Advisory Center for Agriculture, Vologda Dairy Farming Academy named after Vereshchagin, Vologda State University, Vologda Agro-Economic College, and breeding enterprises of Vologda and Cherepovets districts.

17 reports were presented at the section. The reports of Northwestern Dairy Farming and Grassland Management Research Institute presentations were presented by: Director K.A. Zadumkin, Candidate of Sciences (Economics) (report "On the need to reconsider approaches to managing the development of rural territories in Russia"); N.Yu. Konovalova, head of the Department of Plant Production ("The development of forage production based on modern technologies of forage crops cultivation in conditions of the Russian European North"), P.A. Fomenko, senior researcher at the Department of Forage and Feeding of Farm Animals ("The chemical composition of feed harvested in the Vologda Oblast"), M.O. Selimyan, laboratory researcher at the Department of Farm Breeding ("The influence of exterior features of Ayrshire cows of first calving on milk producing ability"), I.V. Gusarov, head of the Department of Feed and Feeding of Farm Animals, Candidate of Sciences (Biology) ("The main arguments in favor of bison preservation"), and N.I. Abramova, head of the Department of Farm Animal Breeding, Candidate of Sciences (Agriculture). ("The development of dairy cattle breeding in the European North of Russia").

The materials were discussed by: A.N. Naliukhin (associate professor at the Department of Plant Breeding, Agriculture and Agricultural Chemistry at Vologda Dairy Farming Academy named after Vereshchagin, Doctor of Economics), E.V. Balagurova (consultant at the Department of Animal Husbandry and Breeding of the Agricultural Production Office of DSKhiPR VO), L.L. Shabanova (chief livestock specialist at OAO Plempredpriyatie "Vologodskoe", N.Yu. Konovalova (head of the Department of Crop

Plenary Session
A.A. Shabunova and V.M. Polterovich

At the Plenary Session

Participants of Section
"Socio-Demographic Development of regions: Problems and Prospects"

Production at Northwestern Dairy Farming and Grassland Management Research Institute), and Alexei Vasil'evich Maklakhov (acting director at Institute of Management, Economics and Law of Vologda State University, Doctor of Economics).

Throughout the conference, academic representatives spoke about the importance of socio-economic reforms in conditions where Russian economy is in a difficult situation due to unfavorable political environment and lack of previously existing growth opportunities. The researchers stressed that reforms are needed, primarily aimed at consolidating the public, administration, business, civil society and science. Activities held in the framework of such large-scale conferences help develop new ideas for the implementation of advanced research. In order to achieve the country's sustainable development conference participants expressed their readiness to share the research results not only with each other, but also with the regions' authorities, entrepreneurs and the public.

* * *

The table demonstrates the results of a survey held among the participants of the VIII International research-to-practice conference to assess their satisfaction with its progress and results, as well as the level of organization of plenary and breakout sessions.

Results of express survey (on a ten-point scale: 1 point – low degree ... 10 – high degree)

Conference participants	No. of questionnaires	Satisfaction with progress nd results	General organization
Section 1	19	9.8	9.8
Section 2	19	9.8	9.9
Section 3	19	9.6	9.6
Section 4	38	8.7	9.1
Total for all sections	95	9.5	9.6
Plenary session	64	9.2	9.3
Total for conference	**159**	**9.4**	**9.5**

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AUTHOR GUIDELINES
for Submission of Manuscripts to the Editor of the Scientific Journal
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The Journal publishes original theoretical and experimental articles that fall within the scope of the journal. The manuscript should be of no less than 16 pages (30,000 characters with spaces). The maximum length of the paper submitted to publication is 25 pages (approximately 50,000 characters with spaces). Book reviews, information on scientific conferences, scientific chronicles are also submitted to publication. The papers should contain research findings of completed and methodologically proper works.

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Requirements to the package of materials submitted

The following materials are submitted to the editorial office in electronic form:

1. A file containing the article in a Microsoft Word document, format .docx. The name of the file is typed in the Roman characters and reflects the author's last name (e.g.: Ivanova.docx).
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.
3. Scanned copy of the commitment of the author not to publish the article in other publications.
4. A color photo of the author in the .jpeg / .jpg format of no less than 1 MB.

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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.

5. First page of the article

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.

6. Abstract

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.

Examples of good abstracts for different types of articles (reviews, scientific articles, conceptual articles, application articles) are available at: http://www.emeraldinsight.com/authors/guides/write/abstracts.htm?part=2&PHPSESSID=hdac5rtkb73ae013ofk4g8nrv1.

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.

8. Tables

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.

Tables are inserted; drawing tools and AutoShapes are not allowed; column and cell alignment using spaces or tabs is not allowed. MS WORD table editor is used for tables. Each piece of data of the stub and head of the table correspond to discrete cell. Only editor standard tools are applied for creating and formatting tables, no pilcrows, spaces and extra blank lines for semantic breakdown and line adjustment are allowed.

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The caption and its number are placed below the figure. The word "Figure" is in normal font (without highlighting). The caption runs in bold, center alignment, single-spaced.

MS EXCEL is to be used for creating charts, MS WORD, MS VISIO – for flow charts, MS Equation for formulas.

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1) in MS EXCEL select the chart, using the mouse, right click and select "copy" from the list of options;

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The title of the figure and its number are placed below the figure. The word "Fig." is in common type face. The caption is given in bold and is center aligned.

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.

11. Page footnotes

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The word "References" is given after a 1.5 spacing after the body of the article in lower-case letters, semi-bold italics, center alignment. Then, the list of references is given after the 1.5 spacing.

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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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